4. Place the membrane/electrode in an oven at 100°–170° C. for 10–60 minutes.

F. For Carbon/Ru Oxide Electrode application drying, the following steps are taken:

Repeat step A on the opposite side of the membrane.

G. For acidification, the following steps are taken:

1. For Ion-Exchange, soak membrane/electrodes in lightly boiling dilute MH2S04 solution for 1–3 hours.

2. For cleaning, rinse the membrane/electrodes in deionized water;

3. For drying, dry the membrane/electrodes in air, or air dry then desiccate overnight, or place in a 30°–50° C. oven for 1–3 hours before cutting to the final dimensions.

The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrated and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed and desired to be secured by United States Letters Patent is:

1. An electrochemical gas sensor for quantitative measurement of a gas in an ambient atmosphere comprising:

a porous mixed ionic-electronic conductive sensing electrode having both an electronic conducting material and an ionic conducting material;

a porous mixed ionic-electronic conductive counter electrode having both an electronic conducting material and an ionic conducting material;

a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm;

the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode;

means for electrical measurement;

said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means;

whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic.

2. The electrochemical gas sensor as defined in claim 1, further comprising:

means for applying DC power across the protonic conductive electrolyte membrane;

an electrical connection between the sensing electrode, the counter electrode, and the means for applying DC power across the protonic conductive electrolyte membrane; and

switch means for alternating an electrical connection between the sensing electrode and counter electrode from the electrical measurement means to the means for applying DC power across the protonic conductive electrolyte membrane;

whereby the gas is transported away from the counter electrode when the means for applying DC power across the protonic conductive electrolyte membrane applies a DC power to the sensing and counter electrodes.

3. The electrochemical gas sensor as defined in claim 1, wherein said sensing and counter electrodes comprise carbon.

4. The electrochemical gas sensor as defined in claim 1, wherein said sensing and counter electrodes comprise noble metals.

5. The electrochemical gas sensor as defined in claim 1, wherein said sensing and counter electrodes comprise conductive metal oxides.

6. The electrochemical gas sensor as defined in claim 1, wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer.

7. The electrochemical gas sensor as defined in claim 1, wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane.

8. The electrochemical gas sensor as defined in claim 1, wherein the electrochemical gas sensor is adapted to detect CO.

9. The electrochemical gas sensor as defined in claim 1, wherein the electrochemical gas sensor is adapted to detect $NO_x$.

10. The electrochemical gas sensor as defined in claim 1, wherein the electrochemical gas sensor is adapted to detect hydrogen.

11. The electrochemical gas sensor as defined in claim 1, wherein the electrochemical gas sensor is adapted to detect $H_2S$.

12. The electrochemical gas sensor as defined in claim 1, wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor.

13. The electrochemical gas sensor as defined in claim 1, wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm.

14. The electrochemical gas sensor as defined in claim 1, wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10–50 wt% of a proton conductor material and 50–90 wt% of a first and a second electrical conductor materials.

15. The electrochemical gas sensor as defined in claim 14, wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group.

16. The electrochemical gas sensor as defined in claim 14, wherein one of the first and second electrical conductor materials for the sensing electrode is 50–99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1–50 wt% of platinum.

17. The electrochemical gas sensor as defined in claim 14, wherein one of the first and second electrical conductor materials for the counter electrode is 50–99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1–50 wt% of Ru oxide.

18. The electrochemical gas sensor as defined in claim 1, wherein the electrochemical gas sensor further comprises:

first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conductive material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said protonic conductive electrolyte membrane;

means for applying a DC power across the membrane;

said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across the membrane;

whereby the gas is transported away from the counter electrode when said means for applying DC power across the membrane applies a DC power to the first and second pump electrodes.

19. The electrochemical gas sensor of claim 18, wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise carbon.

20. The electrochemical gas sensor as defined in claim 18, wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise noble metals.

21. The electrochemical gas sensor as defined in claim 18, wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise conductive metal oxides.

22. The electrochemical gas sensor as defined in claim 18, wherein the first and second pumping electrodes have a diameter of about 10 mm, and the first protonic conductive electrolyte membrane has a thickness of about 0.17 mm.

23. The electrochemical gas sensor as defined in claim 18, wherein the electronic and ionic conducting materials of said first and second pumping electrodes are a proton-electron mixed conductive material having 10–50 wt% of a proton conductor material and 50–90 wt% of a first and a second electrical conductor materials.

24. The electrochemical gas sensor as defined in claim 23, wherein the proton conductor material for both the first and second pumping electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group.

25. The electrochemical gas sensor as defined in claim 23, wherein one of the first and second electrical conductor materials for the first pumping electrode is 50–99 wt% of carbon black, and the other of the first and second electrical conductor materials for the first pumping electrode is 10 to 50 wt% of platinum.

26. The electrochemical gas sensor as defined in claim 23, wherein one of the first and second electrical conductor materials for the second pumping electrode is 50–99 wt% of carbon black, and the other of the first and second electrical conductor materials for the second pumping electrode is 10 to 50 wt% of Ru oxide.

27. The electrochemical gas sensor as defined in claim 1, wherein the electrochemical gas sensor further comprises:

a second protonic conductive electrolyte membrane;

first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane;

means for applying a DC power across said second protonic electrolyte membrane;

said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across said second protonic electrolyte membrane;

whereby the gas is transported away from the counter electrode when said means for applying DC power across said second protonic electrolyte membrane applies a DC power to the first and second pump electrodes.

28. The electrochemical gas sensor as defined in claim 27, wherein the second protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer.

29. The electrochemical gas sensor as defined in claim 27, wherein the second protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane.

30. An electrochemical gas sensor for quantitative measurement of a gas in an ambient atmosphere comprising:

a porous mixed ionic-electronic conductive sensing electrode having both an electronic conducting material and an ionic conducting material;

a porous mixed ionic-electronic conductive counter electrode having both an electronic conducting material and an ionic conducting material;

a protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes;

the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode;

means for electrical measurement;

said sensing and counter electrodes having electrically connected therebetween said means for electrical measurement;

means for applying a DC pulse power source across the membrane;

said sensing and counter electrodes having in electrical connection therebetween said means for applying DC pulse power across the membrane; and

switch means for alternating the connection between the sensing and counter electrodes from the electrical measurement means to the means for applying a DC pulse power source across the membrane;

whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic when said switch means connects said electrical measurement means to the sensing and counter electrodes; and

whereby said means for applying a DC pulse power source across the membrane moves CO away from a side of the gas sensor where the counter electrode is placed when said switch means connects said means for applying a DC pulse power source across the membrane to the sensing and counter electrodes.

31. The electrochemical gas sensor as defined in claim 30, wherein said sensing and counter electrodes comprise carbon.

32. The electrochemical gas sensor as defined in claim 30, wherein said sensing and counter electrodes comprise noble metals.

33. The electrochemical gas sensor as defined in claim 30, wherein said sensing and counter electrodes comprise conductive metal oxides.

34. The electrochemical gas sensor as defined in claim 30, wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer.

35. The electrochemical gas sensor as defined in claim 30, wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane.

36. The electrochemical gas sensor as defined in claim 30, wherein the electrochemical gas sensor is adapted to detect CO.

37. The electrochemical gas sensor as defined in claim 30, wherein the electrochemical gas sensor is adapted to detect hydrogen.

38. The electrochemical gas sensor as defined in claim 30, wherein the electrochemical gas sensor is adapted to detect $H_2S$.

39. The electrochemical gas sensor as defined in claim 30, wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor.

40. The electrochemical gas sensor as defined in claim 30, wherein the electrochemical gas sensor is adapted to detect $NO_x$.

41. The electrochemical gas sensor as defined in claim 30, wherein the sensing and counter electrodes have a diameter in a range of 1 mm to 15 mm, and the protonic conductive electrolyte membrane has a thickness in a range of 0.1 mm–1 mm.

42. The electrochemical gas sensor as defined in claim 41, wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm.

43. The electrochemical gas sensor as defined in claim 30, wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10–50 wt% of a proton conductor material and 50–90 wt% of a first and a second electrical conductor materials.

44. The electrochemical gas sensor as defined in claim 43, wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group.

45. The electrochemical gas sensor as defined in claim 43, wherein one of the first and second electrical conductor materials for the sensing electrode is 50–99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1–50 wt% of platinum.

46. The electrochemical gas sensor as defined in claim 43, wherein one of the first and second electrical conductor materials for the counter electrode is 50–99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1–50 wt% of Ru oxide.

47. An electrochemical gas sensor for quantitative measurement of a gas in an ambient atmosphere comprising:

a porous mixed ionic-electronic conductive sensing electrode having both an electronic conducting material and an ionic conducting material and being exposed to the ambient atmosphere;

a porous mixed ionic-conductive counter electrode having both an electronic conducting material and an ionic conducting material;

a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes;

the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode;

a second protonic conductive electrolyte membrane;

first and second porous mixed ionic-electronic conductive pump electrodes, each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane;

said first porous pump electrode being exposed to a chamber sealed off from the ambient atmosphere;

said second porous pump electrode being separated from said counter electrode by a perforated support structure composed of an electrical conducting material, both said second porous pump electrode and said counter electrode being in contact with said perforated support structure;

means for electrical measurement in electrical contact with said sensing electrode and perforated support structure;

means for applying a DC power across said second protonic electrolyte membrane in electrical contact with said first pump electrode and said perforated support structure;

whereby the gas is transported away from the counter electrode when the means for applying a DC power across said second protonic electrolyte membrane applies a DC power across said second protonic electrolyte membrane; and

whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic.

48. The electrochemical gas sensor as defined in claim 47, wherein the sensing and counter electrodes have a diameter in a range of 1 mm–15 mm, and the protonic conductive electrolyte membrane has a thickness in a range of 0.1 mm–1 mm.

49. The electrochemical gas sensor as defined in claim 48, wherein the sensing and electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm.

50. The electrochemical gas sensor as defined in claim 47, wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10–50 wt% of a proton conductor material and 50–90 wt% of a first and a second electrical conductor materials.

51. The electrochemical gas sensor as defined in claim 50, wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group.

52. The electrochemical gas sensor as defined in claim 50, wherein one of the first and second electrical conductor materials for the sensing electrode is 50–99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1–50 wt% of platinum.

53. The electrochemical gas sensor as defined in claim 50, wherein one of the first and second electrical conductor materials for the counter electrode is 50–99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter-reference electrode is 1–50 wt% of Ru oxide.

54. The electrochemical gas sensor as defined in claim 47, wherein the electrochemical gas sensor is adapted to detect CO.

55. The electrochemical gas sensor as defined in claim 47, wherein the electrochemical gas sensor is adapted to detect hydrogen.

56. The electrochemical gas sensor as defined in claim 47, wherein the electrochemical gas sensor is adapted to detect $NO_x$.

57. The electrochemical gas sensor as defined in claim 47, wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor.

58. The electrochemical gas sensor as defined in claim 47, wherein the electrochemical gas sensor is adapted to detect $H_2S$.

59. An electrochemical gas sensor for quantitative measurement of a gas in an ambient atmosphere comprising:

a porous mixed ionic-electronic conductive sensing electrode having both an electronic conducting material and an ionic conducting material and being exposed to the ambient atmosphere;

a porous mixed ionic-electronic conductive reference electrode having both an electronic conducting material and an ionic conducting material;

a porous mixed ionic-conductive counter electrode having both an electrical conducting material and an ionic conducting material, and being separate from both said sensing and reference electrodes;

a protonic conductive electrolyte membrane, having top and bottom sides, said top side of said protonic conductive membrane being in contact with the counter electrode and the reference electrode, the bottom side of said protonic conductive membrane being in contact with the sensing electrode;

the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode;

means for electrical measurement in electrical contact between the sensing electrode and the counter electrode;

means for applying a DC power across said protonic electrolyte membrane in electrical contact between the sensing electrode and said reference electrode;

whereby the gas is transported away from the reference electrode when the means for applying a DC power across said protonic electrolyte membrane applies a DC power across said protonic electrolyte membrane; and

whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic.

60. The electrochemical gas sensor as defined in claim 59, wherein said sensing, count and reference electrodes comprise carbon.

61. The electrochemical gas sensor as defined in claim 59, wherein said sensing, count and reference electrodes comprise noble metals.

62. The electrochemical gas sensor as defined in claim 59, wherein said sensing, counter and reference electrodes comprise conductive metal oxides.

63. The electrochemical gas sensor as defined in claim 59, wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer.

64. The electrochemical gas sensor as defined in claim 59, wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane.

65. The electrochemical gas sensor as defined in claim 59, wherein the electrochemical gas sensor is adapted to detect CO.

66. The electrochemical gas sensor as defined in claim 59, wherein the electrochemical gas sensor is adapted to detect $NO_x$.

67. The electrochemical gas sensor as defined in claim 59, wherein the electrochemical gas sensor is adapted to detect hydrogen.

68. The electrochemical gas sensor as defined in claim 59, wherein the electrochemical gas sensor is adapted to detect $H_2S$.

69. The electrochemical gas sensor as defined in claim 59, wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor.

70. The electrochemical gas sensor as defined in claim 59, wherein the sensing, counter and reference electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm.

71. The electrochemical gas sensor as defined in claim 59, wherein the electronic and ionic conducting materials of said sensing, counter and reference electrodes are a proton-electron mixed conductive material having 10–50 wt% of a proton conductor material and 50–90 wt% of a first and second electrical conductor materials.

72. The electrochemical gas sensor as defined in claim 71, wherein the proton conductor material for both the sensing, counter and reference electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group.

73. The electrochemical gas sensor as defined in claim 71, wherein one of the first and second electrical conductor materials for the sensing electrode is 50–99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1–50 wt% of platinum.

74. The electrochemical gas sensor as defined in claim 71, wherein one of the first and second electrical conductor materials for the counter and reference electrodes is 50–99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter and reference electrodes is 1–50 wt% of Ru oxide.

75. The electrochemical gas sensor as defined in claim 1, wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes.

76. The electrochemical gas sensor as defined in claim 30, wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes.

77. The electrochemical gas sensor as defined in claim 47, wherein the sensing, counter, first pumping, and second pumping electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, first pumping, and second pumping electrodes.

78. The electrochemical gas sensor as defined in claim 59, wherein the sensing, counter, and reference electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, and reference electrodes.

* * * * *

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 1 | 79 | Unlike original patent claim 1, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane." |
| 2 | 79 | Unlike original patent claim 2, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 2, presented reissue claim 79 does not recite the language "means for applying DC power across the protonic conductive electrolyte membrane; an electrical connection between the sensing electrode, the counter electrode, and the means for applying DC power across the protonic conductive electrolyte membrane; and switch means for alternating an electrical connection between the sensing electrode and counter electrode from the electrical measurement means to the means for applying DC power across the protonic conductive electrolyte membrane; whereby the gas is transported away from the counter electrode when the means for applying DC power across the protonic conductive electrolyte membrane applies a DC power to the sensing and counter electrodes." |
| 3 | 79 | Unlike original patent claim 3, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 3, presented reissue claim 79 does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 4 | 79 | Unlike original patent claim 4, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 4, presented reissue claim 79 does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 5 | 79 | Unlike original patent claim 5, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 5, presented reissue claim 79 recites the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 6 | 79 | Unlike original patent claim 6, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 6, presented reissue claim 79 does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 7 | 79 | Unlike original patent claim 7, presented reissue claim 79 recites the language “a two-electrode electrochemical gas sensor” and also recites the language “the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane.”<br><br>Unlike original patent claim 7, presented reissue claim 79 does not recite the language “wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane.” |
| 8 | 79 | Unlike original patent claim 8, presented reissue claim 79 recites the language “a two-electrode electrochemical gas sensor” and also recites the language “the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane.”<br><br>Unlike original patent claim 8, presented reissue claim 79 does not recite the language “wherein the electrochemical gas sensor is adapted to detect CO.” |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 9 | 79 | Unlike original patent claim 9, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 9, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 10 | 79 | Unlike original patent claim 10, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 10, presented reissue claim 79 recites the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 11 | 79 | Unlike original patent claim 11, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 11, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 12 | 79 | Unlike original patent claim 12, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 12, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 13 | 79 | Unlike original patent claim 13, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 13, presented reissue claim 79 does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 14 | 79 | Unlike original patent claim 14, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 14, presented reissue claim 79 does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 15 | 79 | Unlike original patent claim 15, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 15, presented reissue claim 79 does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 16 | 79 | Unlike original patent claim 16, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 16, presented reissue claim 79 does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 17 | 79 | Unlike original patent claim 17, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 17, presented reissue claim 79 does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |
| 18 | 79 | Unlike original patent claim 18, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 18, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor further comprises: first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conductive material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said protonic conductive electrolyte membrane; means for applying a DC power across the membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across the membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across the membrane applies a DC power to the first and second pump electrodes. |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 19 | 79 | Unlike original patent claim 19, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 19, presented reissue claim 79 does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise carbon." |
| 20 | 79 | Unlike original patent claim 20, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 20, presented reissue claim 79 does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 21 | 79 | Unlike original patent claim 21, presented reissue claim 79 recites the language “a two-electrode electrochemical gas sensor” and also recites the language “the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane.”<br><br>Unlike original patent claim 21, presented reissue claim 79 does not recite the language “wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise conductive metal oxides.” |
| 22 | 79 | Unlike original patent claim 22, presented reissue claim 79 recites the language “a two-electrode electrochemical gas sensor” and also recites the language “the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane.”<br><br>Unlike original patent claim 22, presented reissue claim 79 does not recite the language “wherein the first and second pumping electrodes have a diameter of about 10 mm, and the first protonic conductive electrolyte membrane has a thickness of about 0.17 mm.” |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 23 | 79 | Unlike original patent claim 23, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 23, presented reissue claim 79 does not recite the language "wherein the electronic and ionic conducting materials of said first and second pumping electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 24 | 79 | Unlike original patent claim 24, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 24, presented reissue claim 79 does not recite the language "wherein the proton conductor material for both the first and second pumping electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 25 | 79 | Unlike original patent claim 25, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 25, presented reissue claim 79 does not recite the language "wherein one of the first and second electrical conductor materials for the first pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the first pumping electrode is 10 to 50 wt% of platinum." |
| 26 | 79 | Unlike original patent claim 26, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 26, presented reissue claim 79 does not recite the language "wherein one of the first and second electrical conductor materials for the second pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the second pumping electrode is 10 to 50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 27 | 79 | Unlike original patent claim 27, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 27, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor further comprises: a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; means for applying a DC power across said second protonic electrolyte membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across said second protonic electrolyte membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across said second protonic electrolyte membrane applies a DC power to the first and second pump electrodes. |
| 28 | 79 | Unlike original patent claim 28, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 28, presented reissue claim 79 does not recite the language "wherein the second protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 29 | 79 | Unlike original patent claim 29, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 29, presented reissue claim 79 does not recite the language "wherein the second protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 30 | 79 | Unlike original patent claim 30, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 30, presented reissue claim 79 does not recite the language "said sensing and counter electrodes having electrically connected therebetween said means for electrical measurement; means for applying a DC pulse power source across the membrane; said sensing and counter electrodes having in electrical connection therebetween said means for applying DC pulse power across the membrane; and switch means for alternating the connection between the sensing and counter electrodes from the electrical measurement means to the means for applying a DC pulse power source across the membrane; when said switch means connects said electrical measurement means to the sensing and counter electrodes; and whereby said means for applying a DC pulse power source across the membrane moves CO away from a side of the gas sensor where the counter electrode is placed when said switch means connects said means for applying a DC pulse power source across the membrane to the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 31 | 79 | Unlike original patent claim 31, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 31, presented reissue claim 79 does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 32 | 79 | Unlike original patent claim 32, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 32, presented reissue claim 79 does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 33 | 79 | Unlike original patent claim 33, presented reissue claim 79 recites the language “a two-electrode electrochemical gas sensor,” recites the language “a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane” and also recites the language “said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means.”<br><br>Unlike original patent claim 33, presented reissue claim 79 does not recite the language “wherein said sensing and counter electrodes comprise conductive metal oxides.” |
| 34 | 79 | Unlike original patent claim 34, presented reissue claim 79 recites the language “a two-electrode electrochemical gas sensor,” recites the language “a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane” and also recites the language “said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means.”<br><br>Unlike original patent claim 33, presented reissue claim 79 does not recite the language “wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer.” |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 35 | 79 | Unlike original patent claim 35, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 35, presented reissue claim 79 does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 36 | 79 | Unlike original patent claim 36, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 36, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 37 | 79 | Unlike original patent claim 37, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 37, presented reissue claim 79 does not recite the language "rein the electrochemical gas sensor is adapted to detect hydrogen." |
| 38 | 79 | Unlike original patent claim 38, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 38, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 39 | 79 | Unlike original patent claim 39, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 39, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |
| 40 | 79 | Unlike original patent claim 40, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 40, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 41 | 79 | Unlike original patent claim 41, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," and also recites the language the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane." |
| 42 | 79 | U Unlike original patent claim 42, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," and also recites the language the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 40, presented reissue claim 79 does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 43 | 79 | Unlike original patent claim 43, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 43, presented reissue claim 79 does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 44 | 79 | Unlike original patent claim 44, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 44, presented reissue claim 79 does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 45 | 79 | Unlike original patent claim 45, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 45, presented reissue claim 79 does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 46 | 79 | Unlike original patent claim 46, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 46, presented reissue claim 79 does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 47 | 79 | Unlike original patent claim 47, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 47, presented reissue claim 79 does not recite the language "a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes, each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; said first porous pump electrode being exposed to a chamber sealed off from the ambient atmosphere; said second porous pump electrode being separated from said counter electrode by a perforated support structure composed of an electrical conducting material, both said second porous pump electrode and said counter electrode being in contact with said perforated support structure; means for electrical measurement in electrical contact with said sensing electrode and perforated support structure; means for applying a DC power across said second protonic electrolyte membrane in electrical contact with said first pump electrode and said perforated support structure; whereby the gas is transported away from the counter electrode when the means for applying a DC power across said second protonic electrolyte membrane applies a DC power across said second protonic electrolyte membrane; and whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic.." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 48 | 79 | Unlike original patent claim 48, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane." |
| 49 | 79 | Unlike original patent claim 49, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor" and recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 49, presented reissue claim 79 does not recite the language "wherein the sensing and electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 50 | 79 | Unlike original patent claim 50, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 50, presented reissue claim 79 does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 51 | 79 | Unlike original patent claim 51, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 51, presented reissue claim 79 does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 52 | 79 | Unlike original patent claim 52, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 52, presented reissue claim 79 does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 53 | 79 | Unlike original patent claim 53, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 53, presented reissue claim 79 does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter-reference electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 54 | 79 | Unlike original patent claim 54, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 54, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |
| 55 | 79 | Unlike original patent claim 55, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 55, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 56 | 79 | Unlike original patent claim 56, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 56, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 57 | 79 | Unlike original patent claim 57, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 57, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 58 | 79 | Unlike original patent claim 58, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 58, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 59 | 79 | Unlike original patent claim 59, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 59, presented reissue claim 79 does not recite the language "a porous mixed ionic-electronic conductive reference electrode having both an electronic conducting material and an ionic conducting material" and does not recite the language "a protonic conductive electrolyte membrane, having top and bottom sides, said top side of said protonic conductive membrane being in contact with the counter electrode and the reference electrode, the bottom side of said protonic conductive membrane being in contact with the sensing electrode; the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode; means for electrical measurement in electrical contact between the sensing electrode and the counter electrode; means for applying a DC power across said protonic electrolyte membrane in electrical contact between the sensing electrode and said reference electrode; whereby the gas is transported away from the reference electrode when the means for applying a DC power across said protonic electrolyte membrane applies a DC power across said protonic electrolyte membrane." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 60 | 79 | Unlike original patent claim 60, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 60, presented reissue claim 79 does not recite the language "wherein said sensing, count and reference electrodes comprise carbon." |
| 61 | 79 | Unlike original patent claim 61, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 61, presented reissue claim 79 does not recite the language "wherein said sensing, count and reference electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 62 | 79 | Unlike original patent claim 62, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 62, presented reissue claim 79 does not recite the language "wherein said sensing, counter and reference electrodes comprise conductive metal oxides." |
| 63 | 79 | Unlike original patent claim 63, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 63, presented reissue claim 79 does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 64 | 79 | Unlike original patent claim 64, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 64, presented reissue claim 79 does not recite the language "wherein said sensing, counter and reference electrodes comprise conductive metal oxides." |
| 65 | 79 | Unlike original patent claim 65, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 65, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 66 | 79 | Unlike original patent claim 66, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 66, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 67 | 79 | Unlike original patent claim 67, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 67, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 68 | 79 | Unlike original patent claim 68, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 68, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 69 | 79 | Unlike original patent claim 69, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 69, presented reissue claim 79 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 70 | 79 | Unlike original patent claim 70, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 70, presented reissue claim 79 does not recite the language "wherein the sensing, counter and reference electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 71 | 79 | Unlike original patent claim 71, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 71, presented reissue claim 79 does not recite the language "wherein the electronic and ionic conducting materials of said sensing, counter and reference electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 72 | 79 | Unlike original patent claim 72, presented reissue claim 79 recites the language “a two-electrode electrochemical gas sensor,” recites the language “a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane” and also recites the language “said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means.”<br><br>Unlike, original patent claim 72, presented reissue claim 79 does not recite the language “wherein the proton conductor material for both the sensing, counter and reference electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group.” |
| 73 | 79 | Unlike original patent claim 73, presented reissue claim 79 recites the language “a two-electrode electrochemical gas sensor,” recites the language “a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane” and also recites the language “said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means.”<br><br>Unlike original patent claim 73, presented reissue claim 79 does not recite the language “wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum.” |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 74 | 79 | Unlike original patent claim 74, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 74, presented reissue claim 79 does not recite the language "wherein one of the first and second electrical conductor materials for the counter and reference electrodes is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter and reference electrodes is 1-50 wt% of Ru oxide." |
| 75 | 79 | Unlike original patent claim 75, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 75, presented reissue claim 79 does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 76 | 79 | Unlike original patent claim 76, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 76, presented reissue claim 79 does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |
| 77 | 79 | Unlike original patent claim 77, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 77, presented reissue claim 79 does not recite the language "wherein the sensing, counter, first pumping, and second pumping electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, first pumping, and second pumping electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 78 | 79 | Unlike original patent claim 78, presented reissue claim 79 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 78, presented reissue claim 79 does not recite the language "wherein the sensing, counter, and reference electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, and reference electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 1 | 80 | Unlike original patent claim 1, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode." |
| 2 | 80 | Unlike original patent claim 2, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 2, presented reissue claim 80 does not recite the language "means for applying DC power across the protonic conductive electrolyte membrane; an electrical connection between the sensing electrode, the counter electrode, and the means for applying DC power across the protonic conductive electrolyte membrane; and switch means for alternating an electrical connection between the sensing electrode and counter electrode from the electrical measurement means to the means for applying DC power across the protonic conductive electrolyte membrane; whereby the gas is transported away from the counter electrode when the means for applying DC power across the protonic conductive electrolyte membrane applies a DC power to the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 3 | 80 | Unlike original patent claim 3, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 3, presented reissue claim 80 does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 4 | 80 | Unlike original patent claim 4, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 4, presented reissue claim 80 does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 5 | 80 | Unlike original patent claim 5, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 5, presented reissue claim 80 does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 6 | 80 | Unlike original patent claim 6, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 6, presented reissue claim 80 does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 7 | 80 | Unlike original patent claim 7, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 7, presented reissue claim 80 does not recite the language" wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 8 | 80 | Unlike original patent claim 8, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 8, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 9 | 80 | Unlike original patent claim 9, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 9, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 10 | 80 | Unlike original patent claim 10, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 10, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 11 | 80 | Unlike original patent claim 11, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 11, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 12 | 80 | Unlike original patent claim 12, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 12, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 13 | 80 | Unlike original patent claim 13, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 13, presented reissue claim 80 does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 14 | 80 | Unlike original patent claim 14, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 14, presented reissue claim 80 does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 15 | 80 | Unlike original patent claim 15, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 15, presented reissue claim 80 does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 16 | 80 | Unlike original patent claim 16, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 16, presented reissue claim 80 does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 17 | 80 | Unlike original patent claim 17, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 17, presented reissue claim 80 does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |
| 18 | 80 | Unlike original patent claim 18, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 18, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor further comprises: first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conductive material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said protonic conductive electrolyte membrane; means for applying a DC power across the membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across the membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across the membrane applies a DC power to the first and second pump electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 19 | 80 | Unlike original patent claim 19, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 19, presented reissue claim 80 does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise carbon." |
| 20 | 80 | Unlike original patent claim 20, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 20, presented reissue claim 80 does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 21 | 80 | Unlike original patent claim 21, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 21, presented reissue claim 80 does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise conductive metal oxides." |
| 22 | 80 | Unlike original patent claim 22, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 22, presented reissue claim 80 does not recite the language "wherein the first and second pumping electrodes have a diameter of about 10 mm, and the first protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 23 | 80 | Unlike original patent claim 23, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 23, presented reissue claim 80 does not recite the language "wherein the electronic and ionic conducting materials of said first and second pumping electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 24 | 80 | Unlike original patent claim 24, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 24, presented reissue claim 80 does not recite the language "wherein the proton conductor material for both the first and second pumping electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 25 | 80 | Unlike original patent claim 25, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 25, presented reissue claim 80 does not recite the language "wherein one of the first and second electrical conductor materials for the first pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the first pumping electrode is 10 to 50 wt% of platinum." |
| 26 | 80 | Unlike original patent claim 26, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 26, presented reissue claim 80 does not recite the language "wherein one of the first and second electrical conductor materials for the second pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the second pumping electrode is 10 to 50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 27 | 80 | Unlike original patent claim 27, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 27, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor further comprises: a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; means for applying a DC power across said second protonic electrolyte membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across said second protonic electrolyte membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across said second protonic electrolyte membrane applies a DC power to the first and second pump electrodes." |
| 28 | 80 | Unlike original patent claim 28, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 28, presented reissue claim 80 does not recite the language "wherein the second protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 29 | 80 | Unlike original patent claim 29, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 29, presented reissue claim 80 does not recite the language "wherein the second protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 30 | 80 | Unlike original patent claim 30, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 30, presented reissue claim 80 does not recite the language "means for applying a DC pulse power source across the membrane; said sensing and counter electrodes having in electrical connection therebetween said means for applying DC pulse power across the membrane; and switch means for alternating the connection between the sensing and counter electrodes from the electrical measurement means to the means for applying a DC pulse power source across the membrane; whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic when said switch means connects said electrical measurement means to the sensing and counter electrodes; and whereby said means for applying a DC pulse power source across the membrane moves CO away from a side of the gas sensor where the counter electrode is placed when said switch means connects said means for applying a DC pulse power source across the membrane to the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 31 | 80 | Unlike original patent claim 31, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 31, presented reissue claim 80 does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 32 | 80 | Unlike original patent claim 32, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 32, presented reissue claim 80 does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 33 | 80 | Unlike original patent claim 33, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 33, presented reissue claim 80 does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 34 | 80 | Unlike original patent claim 34, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 34, presented reissue claim 80 does not recite the language wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 35 | 80 | Unlike original patent claim 35, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 35, presented reissue claim 80 does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 36 | 80 | Unlike original patent claim 36, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 36, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 37 | 80 | Unlike original patent claim 37, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 37, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |
| 38 | 80 | Unlike original patent claim 38, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 38, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 39 | 80 | Unlike original patent claim 39, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 39, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |
| 40 | 80 | Unlike original patent claim 40, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 40, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 41 | 80 | Unlike original patent claim 41, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode." |
| 42 | 80 | Unlike original patent claim 42, presented reissue claim 80 recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 42, presented reissue claim 80 does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 43 | 80 | Unlike original patent claim 43, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 43, presented reissue claim 80 does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 44 | 80 | Unlike original patent claim 44, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 44, presented reissue claim 80 does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 45 | 80 | Unlike original patent claim 45, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 45, presented reissue claim 80 does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 46 | 80 | Unlike original patent claim 46, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 46, presented reissue claim 80 does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 47 | 80 | Unlike original patent claim 47, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 47, presented reissue claim 80 does not recite the language "a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes, each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; said first porous pump electrode being exposed to a chamber sealed off from the ambient atmosphere; said second porous pump electrode being separated from said counter electrode by a perforated support structure composed of an electrical conducting material, both said second porous pump electrode and said counter electrode being in contact with said perforated support structure; means for electrical measurement in electrical contact with said sensing electrode and perforated support structure; means for applying a DC power across said second protonic electrolyte membrane in electrical contact with said first pump electrode and said perforated support structure; whereby the gas is transported away from the counter electrode when the means for applying a DC power across said second protonic electrolyte membrane applies a DC power across said second protonic electrolyte membrane; and whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic. |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 48 | 80 | Unlike original patent claim 48, presented reissue claim 80 recites the language "presented reissue claim 80 recites the language the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode." |
| 49 | 80 | Unlike original patent claim 49, presented reissue claim 80 recites the language "presented reissue claim 80 recites the language the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 49, presented reissue claim 80 does not recite the language "wherein the sensing and electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 50 | 80 | Unlike original patent claim 50, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes,, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 50, presented reissue claim 80 does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 51 | 80 | Unlike original patent claim 51, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 51, presented reissue claim 80 does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 52 | 80 | Unlike original patent claim 52, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 52, presented reissue claim 80 does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 53 | 80 | Unlike original patent claim 53, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 53, presented reissue claim 80 does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter-reference electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 54 | 80 | Unlike original patent claim 54, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 54, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |
| 55 | 80 | Unlike original patent claim 55, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 55, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 56 | 80 | Unlike original patent claim 56, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 56, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 57 | 80 | Unlike original patent claim 57, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 57, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 58 | 80 | Unlike original patent claim 58, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 58, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 59 | 80 | Unlike original patent claim 59, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 59, presented reissue claim 80 does not recite the language "a protonic conductive electrolyte membrane, having top and bottom sides, said top side of said protonic conductive membrane being in contact with the counter electrode and the reference electrode, the bottom side of said protonic conductive membrane being in contact with the sensing electrode; means for electrical measurement in electrical contact between the sensing electrode and the counter electrode; means for applying a DC power across said protonic electrolyte membrane in electrical contact between the sensing electrode and said reference electrode; whereby the gas is transported away from the reference electrode when the means for applying a DC power across said protonic electrolyte membrane applies a DC power across said protonic electrolyte membrane; and whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 60 | 80 | Unlike original patent claim 60, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 60, presented reissue claim 80 does not recite the language "wherein said sensing, count and reference electrodes comprise carbon." |
| 61 | 80 | Unlike original patent claim 61, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 61, presented reissue claim 80 does not recite the language "wherein said sensing, count and reference electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 62 | 80 | Unlike original patent claim 62, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 62, presented reissue claim 80 does not recite the language "wherein said sensing, counter and reference electrodes comprise conductive metal oxides." |
| 63 | 80 | Unlike original patent claim 63, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 63, presented reissue claim 80 does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 64 | 80 | Unlike original patent claim 64, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 64, presented reissue claim 80 does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 65 | 80 | Unlike original patent claim 65, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 65, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 66 | 80 | Unlike original patent claim 66, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 66, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 67 | 80 | Unlike original patent claim 67, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 67, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 68 | 80 | Unlike original patent claim 68, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 68, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 69 | 80 | Unlike original patent claim 69, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 69, presented reissue claim 80 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 70 | 80 | Unlike original patent claim 70, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 70, presented reissue claim 80 does not recite the language "wherein the sensing, counter and reference electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 71 | 80 | Unlike original patent claim 71, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 71, presented reissue claim 80 does not recite the language "wherein the electronic and ionic conducting materials of said sensing, counter and reference electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 72 | 80 | Unlike original patent claim 72, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 72, presented reissue claim 80 does not recite the language "wherein the proton conductor material for both the sensing, counter and reference electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 73 | 80 | Unlike original patent claim 73, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 73, presented reissue claim 80 does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 74 | 80 | Unlike original patent claim 74, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 74, presented reissue claim 80 does not recite the language "wherein one of the first and second electrical conductor materials for the counter and reference electrodes is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter and reference electrodes is 1-50 wt% of Ru oxide." |
| 75 | 80 | Unlike original patent claim 75, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 75, presented reissue claim 80 does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 76 | 80 | Unlike original patent claim 76, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 76, presented reissue claim 80 does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |
| 77 | 80 | Unlike original patent claim 77, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 77, presented reissue claim 80 does not recite the language "wherein the sensing, counter, first pumping, and second pumping electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, first pumping, and second pumping electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 78 | 80 | Unlike original patent claim 78, presented reissue claim 80 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 78, presented reissue claim 80 does not recite the language "wherein the sensing, counter, and reference electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, and reference electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 1 | 81 | Unlike original patent claim 1, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode." |
| 2 | 81 | Unlike original patent claim 2, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 2, presented reissue claim 81 does not recite the language "means for applying DC power across the protonic conductive electrolyte membrane; an electrical connection between the sensing electrode, the counter electrode, and the means for applying DC power across the protonic conductive electrolyte membrane; and switch means for alternating an electrical connection between the sensing electrode and counter electrode from the electrical measurement means to the means for applying DC power across the protonic conductive electrolyte membrane; whereby the gas is transported away from the counter electrode when the means for applying DC power across the protonic conductive electrolyte membrane applies a DC power to the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 3 | 81 | Unlike original patent claim 3, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 3, presented reissue claim 81 does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 4 | 81 | Unlike original patent claim 4, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 4, presented reissue claim 81 does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 5 | 81 | Unlike original patent claim 5, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 5, presented reissue claim 81 does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 6 | 81 | Unlike original patent claim 6, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 6, presented reissue claim 81 does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 7 | 81 | Unlike original patent claim 7, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 7, presented reissue claim 81 does not recite the language" wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 8 | 81 | Unlike original patent claim 8, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 8, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 9 | 81 | Unlike original patent claim 9, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 9, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 10 | 81 | Unlike original patent claim 10, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 10, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 11 | 81 | Unlike original patent claim 11, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 11, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 12 | 81 | Unlike original patent claim 12, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 12, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 13 | 81 | Unlike original patent claim 13, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 13, presented reissue claim 81 does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 14 | 81 | Unlike original patent claim 14, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 14, presented reissue claim 81 does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 15 | 81 | Unlike original patent claim 15, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 15, presented reissue claim 81 does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 16 | 81 | Unlike original patent claim 16, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 16, presented reissue claim 81 does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 17 | 81 | Unlike original patent claim 17, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 17, presented reissue claim 81 does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |
| 18 | 81 | Unlike original patent claim 18, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 18, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor further comprises: first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conductive material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said protonic conductive electrolyte membrane; means for applying a DC power across the membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across the membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across the membrane applies a DC power to the first and second pump electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 19 | 81 | Unlike original patent claim 19, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 19, presented reissue claim 81 does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise carbon." |
| 20 | 81 | Unlike original patent claim 20, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 20, presented reissue claim 81 does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 21 | 81 | Unlike original patent claim 21, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 21, presented reissue claim 81 does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise conductive metal oxides." |
| 22 | 81 | Unlike original patent claim 22, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 22, presented reissue claim 81 does not recite the language "wherein the first and second pumping electrodes have a diameter of about 10 mm, and the first protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 23 | 81 | Unlike original patent claim 23, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 23, presented reissue claim 81 does not recite the language "wherein the electronic and ionic conducting materials of said first and second pumping electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 24 | 81 | Unlike original patent claim 24, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 24, presented reissue claim 81 does not recite the language "wherein the proton conductor material for both the first and second pumping electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 25 | 81 | Unlike original patent claim 25, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 25, presented reissue claim 81 does not recite the language "wherein one of the first and second electrical conductor materials for the first pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the first pumping electrode is 10 to 50 wt% of platinum." |
| 26 | 81 | Unlike original patent claim 26, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 26, presented reissue claim 81 does not recite the language "wherein one of the first and second electrical conductor materials for the second pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the second pumping electrode is 10 to 50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 27 | 81 | Unlike original patent claim 27, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 27, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor further comprises: a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; means for applying a DC power across said second protonic electrolyte membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across said second protonic electrolyte membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across said second protonic electrolyte membrane applies a DC power to the first and second pump electrodes." |
| 28 | 81 | Unlike original patent claim 28, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 28, presented reissue claim 81 does not recite the language "wherein the second protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 29 | 81 | Unlike original patent claim 29, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 29, presented reissue claim 81 does not recite the language "wherein the second protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 30 | 81 | Unlike original patent claim 30, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 30, presented reissue claim 81 does not recite the language "means for applying a DC pulse power source across the membrane; said sensing and counter electrodes having in electrical connection therebetween said means for applying DC pulse power across the membrane; and switch means for alternating the connection between the sensing and counter electrodes from the electrical measurement means to the means for applying a DC pulse power source across the membrane; whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic when said switch means connects said electrical measurement means to the sensing and counter electrodes; and whereby said means for applying a DC pulse power source across the membrane moves CO away from a side of the gas sensor where the counter electrode is placed when said switch means connects said means for applying a DC pulse power source across the membrane to the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 31 | 81 | Unlike original patent claim 31, presented reissue claim 81 recites the language “a two-electrode electrochemical gas sensor,” recites the language “a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode” and also recites the language “said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means.”<br><br>Unlike original patent claim 31, presented reissue claim 81 does not recite the language “wherein said sensing and counter electrodes comprise carbon.” |
| 32 | 81 | Unlike original patent claim 32, presented reissue claim 81 recites the language “a two-electrode electrochemical gas sensor,” recites the language “a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode” and also recites the language “said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means.”<br><br>Unlike original patent claim 32, presented reissue claim 81 does not recite the language “wherein said sensing and counter electrodes comprise noble metals.” |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 33 | 81 | Unlike original patent claim 33, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 33, presented reissue claim 81 does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 34 | 81 | Unlike original patent claim 34, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 34, presented reissue claim 81 does not recite the language wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 35 | 81 | Unlike original patent claim 35, presented reissue claim 81 recites the language “a two-electrode electrochemical gas sensor,” recites the language “a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode” and also recites the language “said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means.”<br><br>Unlike original patent claim 35, presented reissue claim 81 does not recite the language “wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane.” |
| 36 | 81 | Unlike original patent claim 36, presented reissue claim 81 recites the language “a two-electrode electrochemical gas sensor,” recites the language “a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode” and also recites the language “said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means.”<br><br>Unlike original patent claim 36, presented reissue claim 81 does not recite the language “wherein the electrochemical gas sensor is adapted to detect CO.” |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 37 | 81 | Unlike original patent claim 37, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 37, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |
| 38 | 81 | Unlike original patent claim 38, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 38, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 39 | 81 | Unlike original patent claim 39, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 39, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |
| 40 | 81 | Unlike original patent claim 40, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 40, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 41 | 81 | Unlike original patent claim 41, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," and recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode." |
| 42 | 81 | Unlike original patent claim 42, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," and recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 42, presented reissue claim 81 does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 43 | 81 | Unlike original patent claim 43, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 43, presented reissue claim 81 does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 44 | 81 | Unlike original patent claim 44, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 44, presented reissue claim 81 does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 45 | 81 | Unlike original patent claim 45, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 45, presented reissue claim 81 does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 46 | 81 | Unlike original patent claim 46, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 46, presented reissue claim 81 does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 47 | 81 | Unlike original patent claim 47, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 47, presented reissue claim 81 does not recite the language "a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes, each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; said first porous pump electrode being exposed to a chamber sealed off from the ambient atmosphere; said second porous pump electrode being separated from said counter electrode by a perforated support structure composed of an electrical conducting material, both said second porous pump electrode and said counter electrode being in contact with said perforated support structure; means for electrical measurement in electrical contact with said sensing electrode and perforated support structure; means for applying a DC power across said second protonic electrolyte membrane in electrical contact with said first pump electrode and said perforated support structure; whereby the gas is transported away from the counter electrode when the means for applying a DC power across said second protonic electrolyte membrane applies a DC power across said second protonic electrolyte membrane; and whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic. |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 48 | 81 | Unlike original patent claim 48, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode." |
| 49 | 81 | Unlike original patent claim 49, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," and also recites the language "the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 49, presented reissue claim 81 does not recite the language "wherein the sensing and electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 50 | 81 | Unlike original patent claim 50, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 50, presented reissue claim 81 does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 51 | 81 | Unlike original patent claim 51, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 51, presented reissue claim 81 does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 52 | 81 | Unlike original patent claim 52, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 52, presented reissue claim 81 does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 53 | 81 | Unlike original patent claim 53, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 53, presented reissue claim 81 does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter-reference electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 54 | 81 | Unlike original patent claim 54, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 54, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |
| 55 | 81 | Unlike original patent claim 55, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 55, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 56 | 81 | Unlike original patent claim 56, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 56, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 57 | 81 | Unlike original patent claim 57, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 57, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 58 | 81 | Unlike original patent claim 58, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 58, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 59 | 81 | Unlike original patent claim 59, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 59, presented reissue claim 81 does not recite the language "a protonic conductive electrolyte membrane, having top and bottom sides, said top side of said protonic conductive membrane being in contact with the counter electrode and the reference electrode, the bottom side of said protonic conductive membrane being in contact with the sensing electrode; means for electrical measurement in electrical contact between the sensing electrode and the counter electrode; means for applying a DC power across said protonic electrolyte membrane in electrical contact between the sensing electrode and said reference electrode; whereby the gas is transported away from the reference electrode when the means for applying a DC power across said protonic electrolyte membrane applies a DC power across said protonic electrolyte membrane; and whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 60 | 81 | Unlike original patent claim 60, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 60, presented reissue claim 81 does not recite the language "wherein said sensing, count and reference electrodes comprise carbon." |
| 61 | 81 | Unlike original patent claim 61, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 61, presented reissue claim 81 does not recite the language "wherein said sensing, count and reference electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 62 | 81 | Unlike original patent claim 62, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 62, presented reissue claim 81 does not recite the language "wherein said sensing, counter and reference electrodes comprise conductive metal oxides." |
| 63 | 81 | Unlike original patent claim 63, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 63, presented reissue claim 81 does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 64 | 81 | Unlike original patent claim 64, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 64, presented reissue claim 81 does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 65 | 81 | Unlike original patent claim 65, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 65, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 66 | 81 | Unlike original patent claim 66, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 66, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 67 | 81 | Unlike original patent claim 67, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 67, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 68 | 81 | Unlike original patent claim 68, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 68, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 69 | 81 | Unlike original patent claim 69, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 69, presented reissue claim 81 does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 70 | 81 | Unlike original patent claim 70, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 70, presented reissue claim 81 does not recite the language "wherein the sensing, counter and reference electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 71 | 81 | Unlike original patent claim 71, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 71, presented reissue claim 81 does not recite the language "wherein the electronic and ionic conducting materials of said sensing, counter and reference electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 72 | 81 | Unlike original patent claim 72, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 72, presented reissue claim 81 does not recite the language "wherein the proton conductor material for both the sensing, counter and reference electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 73 | 81 | Unlike original patent claim 73, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 73, presented reissue claim 81 does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 74 | 81 | Unlike original patent claim 74, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 74, presented reissue claim 81 does not recite the language "wherein one of the first and second electrical conductor materials for the counter and reference electrodes is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter and reference electrodes is 1-50 wt% of Ru oxide." |
| 75 | 81 | Unlike original patent claim 75, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 75, presented reissue claim 81 does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 76 | 81 | Unlike original patent claim 76, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 76, presented reissue claim 81 does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |
| 77 | 81 | Unlike original patent claim 77, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 77, presented reissue claim 81 does not recite the language "wherein the sensing, counter, first pumping, and second pumping electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, first pumping, and second pumping electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 78 | 81 | Unlike original patent claim 78, presented reissue claim 81 recites the language "a two-electrode electrochemical gas sensor," recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode" and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 78, presented reissue claim 81 does not recite the language "wherein the sensing, counter, and reference electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, and reference electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 1 | 82 | Unlike original patent claim 1, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 1, presented reissue claim 82 does not recite the language "quantitative measurement." |
| 2 | 82 | Unlike original patent claim 2, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 2, presented reissue claim 82 does not recite the language "quantitative measurement," does not recite the language "means for applying DC power across the protonic conductive electrolyte membrane; an electrical connection between the sensing electrode, the counter electrode, and the means for applying DC power across the protonic conductive electrolyte membrane; and switch means for alternating an electrical connection between the sensing electrode and counter electrode from the electrical measurement means to the means for applying DC power across the protonic conductive electrolyte membrane; whereby the gas is transported away from the counter electrode when the means for applying DC power across the protonic conductive electrolyte membrane applies a DC power to the sensing and counter electrodes." |
| 3 | 82 | Unlike original patent claim 3, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 3, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 4 | 82 | Unlike original patent claim 4, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 4, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 5 | 82 | Unlike original patent claim 5, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 5, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 6 | 82 | Unlike original patent claim 6, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 6, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 7 | 82 | Unlike original patent claim 7, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 7, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 8 | 82 | Unlike original patent claim 8, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 8, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 9 | 82 | Unlike original patent claim 9, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br>Unlike original patent claim 9, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 10 | 82 | Unlike original patent claim 10, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 10, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 11 | 82 | Unlike original patent claim 11, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 11, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 12 | 82 | Unlike original patent claim 12, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 12, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 13 | 82 | Unlike original patent claim 13, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 13, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 14 | 82 | Unlike original patent claim 14, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 14, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 15 | 82 | Unlike original patent claim 15, presented reissue claim 82 recites the language “the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane.”<br><br>Unlike original patent claim 15, presented reissue claim 82 does not recite the language “quantitative measurement,” and also does not recite the language “wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group.” |
| 16 | 82 | Unlike original patent claim 16, presented reissue claim 82 recites the language “the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane.”<br><br>Unlike original patent claim 16, presented reissue claim 82 does not recite the language “quantitative measurement,” and also does not recite the language “wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum.” |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 17 | 82 | Unlike original patent claim 17, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 17, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |
| 18 | 82 | Unlike original patent claim 18, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 18, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor further comprises: first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conductive material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said protonic conductive electrolyte membrane; means for applying a DC power across the membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across the membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across the membrane applies a DC power to the first and second pump electrodes. |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 19 | 82 | Unlike original patent claim 19, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 19, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise carbon." |
| 20 | 82 | Unlike original patent claim 20, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 20, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 21 | 82 | Unlike original patent claim 21, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 21, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise conductive metal oxides." |
| 22 | 82 | Unlike original patent claim 22, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 22, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the first and second pumping electrodes have a diameter of about 10 mm, and the first protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 23 | 82 | Unlike original patent claim 23, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 23, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said first and second pumping electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 24 | 82 | Unlike original patent claim 24, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 24, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the first and second pumping electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 25 | 82 | Unlike original patent claim 25, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 25, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the first pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the first pumping electrode is 10 to 50 wt% of platinum." |
| 26 | 82 | Unlike original patent claim 26, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 26, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the second pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the second pumping electrode is 10 to 50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 27 | 82 | Unlike original patent claim 27, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 27, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor further comprises: a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; means for applying a DC power across said second protonic electrolyte membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across said second protonic electrolyte membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across said second protonic electrolyte membrane applies a DC power to the first and second pump electrodes. |
| 28 | 82 | Unlike original patent claim 28, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 28, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the second protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 29 | 82 | Unlike original patent claim 29, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 29, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the second protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 30 | 82 | Unlike original patent claim 30, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 30, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "said sensing and counter electrodes having electrically connected therebetween said means for electrical measurement; means for applying a DC pulse power source across the membrane; said sensing and counter electrodes having in electrical connection therebetween said means for applying DC pulse power across the membrane; and switch means for alternating the connection between the sensing and counter electrodes from the electrical measurement means to the means for applying a DC pulse power source across the membrane; when said switch means connects said electrical measurement means to the sensing and counter electrodes; and whereby said means for applying a DC pulse power source across the membrane moves CO away from a side of the gas sensor where the counter electrode is placed when said switch means connects said means for applying a DC pulse power source across the membrane to the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 31 | 82 | Unlike original patent claim 31, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 31, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 32 | 82 | Unlike original patent claim 32, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 32, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 33 | 82 | Unlike original patent claim 33, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 33, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 34 | 82 | Unlike original patent claim 34, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 34, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 35 | 82 | Unlike original patent claim 35, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 35, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 36 | 82 | Unlike original patent claim 36, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 36, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 37 | 82 | Unlike original patent claim 37, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 37, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "rein the electrochemical gas sensor is adapted to detect hydrogen." |
| 38 | 82 | Unlike original patent claim 38, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 38, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 39 | 82 | Unlike original patent claim 39, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 39, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |
| 40 | 82 | Unlike original patent claim 40, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 40, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 41 | 82 | Unlike original patent claim 41, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 41, presented reissue claim 82 does not recite the language "quantitative measurement." |
| 42 | 82 | Unlike original patent claim 42, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 42, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 43 | 82 | Unlike original patent claim 43, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 43, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 44 | 82 | Unlike original patent claim 44, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 44, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| | | |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 45 | 82 | Unlike original patent claim 45, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 45, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 46 | 82 | Unlike original patent claim 46, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 46, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 47 | 82 | Unlike original patent claim 47, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 47, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes, each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; said first porous pump electrode being exposed to a chamber sealed off from the ambient atmosphere; said second porous pump electrode being separated from said counter electrode by a perforated support structure composed of an electrical conducting material, both said second porous pump electrode and said counter electrode being in contact with said perforated support structure; means for electrical measurement in electrical contact with said sensing electrode and perforated support structure; means for applying a DC power across said second protonic electrolyte membrane in electrical contact with said first pump electrode and said perforated support structure; whereby the gas is transported away from the counter electrode when the means for applying a DC power across said second protonic electrolyte membrane applies a DC power across said second protonic electrolyte membrane; and whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic.." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 48 | 82 | Unlike original patent claim 48, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 48, presented reissue claim 82 does not recite the language "quantitative measurement." |
| 49 | 82 | Unlike original patent claim 49, presented reissue claim 82 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 49, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 50 | 82 | Unlike original patent claim 50, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 50, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 51 | 82 | Unlike original patent claim 51, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 51, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 52 | 82 | Unlike original patent claim 52, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 52, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 53 | 82 | Unlike original patent claim 53, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 53, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter-reference electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 54 | 82 | Unlike original patent claim 54, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 54, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |
| 55 | 82 | Unlike original patent claim 55, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 55, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 56 | 82 | Unlike original patent claim 56, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 56, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 57 | 82 | Unlike original patent claim 57, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 57, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 58 | 82 | Unlike original patent claim 58, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 58, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 59 | 82 | Unlike original patent claim 59, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 59, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "a porous mixed ionic-electronic conductive reference electrode having both an electronic conducting material and an ionic conducting material" and does not recite the language "a protonic conductive electrolyte membrane, having top and bottom sides, said top side of said protonic conductive membrane being in contact with the counter electrode and the reference electrode, the bottom side of said protonic conductive membrane being in contact with the sensing electrode; the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode; means for electrical measurement in electrical contact between the sensing electrode and the counter electrode; means for applying a DC power across said protonic electrolyte membrane in electrical contact between the sensing electrode and said reference electrode; whereby the gas is transported away from the reference electrode when the means for applying a DC power across said protonic electrolyte membrane applies a DC power across said protonic electrolyte membrane." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 60 | 82 | Unlike original patent claim 60, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 60, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing, count and reference electrodes comprise carbon." |
| 61 | 82 | Unlike original patent claim 61, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 61, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing, count and reference electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 62 | 82 | Unlike original patent claim 62, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 62, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing, counter and reference electrodes comprise conductive metal oxides." |
| 63 | 82 | Unlike original patent claim 63, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 63, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 64 | 82 | Unlike original patent claim 64, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 64, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing, counter and reference electrodes comprise conductive metal oxides." |
| 65 | 82 | Unlike original patent claim 65, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 65, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 66 | 82 | Unlike original patent claim 66, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 66, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 67 | 82 | Unlike original patent claim 67, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 67, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 68 | 82 | Unlike original patent claim 68, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 68, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 69 | 82 | Unlike original patent claim 69, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 69, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 70 | 82 | Unlike original patent claim 70, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 70, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing, counter and reference electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 71 | 82 | Unlike original patent claim 71, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 71, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing, counter and reference electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 72 | 82 | Unlike original patent claim 72, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 72, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the sensing, counter and reference electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 73 | 82 | Unlike original patent claim 73, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 73, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 74 | 82 | Unlike original patent claim 74, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 74, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter and reference electrodes is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter and reference electrodes is 1-50 wt% of Ru oxide." |
| 75 | 82 | Unlike original patent claim 75, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 75, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 76 | 82 | Unlike original patent claim 76, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 76, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |
| 77 | 82 | Unlike original patent claim 77, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike original patent claim 77, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing, counter, first pumping, and second pumping electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, first pumping, and second pumping electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 78 | 82 | Unlike original patent claim 78, presented reissue claim 82 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means."<br><br>Unlike, original patent claim 78, presented reissue claim 82 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing, counter, and reference electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, and reference electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 1 | 83 | Unlike original patent claim 1, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 1, presented reissue claim 83 does not recite the language "quantitative measurement." |
| 2 | 83 | Unlike original patent claim 2, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 2, presented reissue claim 83 does not recite the language "quantitative measurement," does not recite the language "means for applying DC power across the protonic conductive electrolyte membrane; an electrical connection between the sensing electrode, the counter electrode, and the means for applying DC power across the protonic conductive electrolyte membrane; and switch means for alternating an electrical connection between the sensing electrode and counter electrode from the electrical measurement means to the means for applying DC power across the protonic conductive electrolyte membrane; whereby the gas is transported away from the counter electrode when the means for applying DC power across the protonic conductive electrolyte membrane applies a DC power to the sensing and counter electrodes." |
| 3 | 83 | Unlike original patent claim 3, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 3, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 4 | 83 | Unlike original patent claim 4, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 4, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 5 | 83 | Unlike original patent claim 5, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 5, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 6 | 83 | Unlike original patent claim 6, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 6, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 7 | 83 | Unlike original patent claim 7, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 7, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 8 | 83 | Unlike original patent claim 8, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 8, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 9 | 83 | Unlike original patent claim 9, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 9, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 10 | 83 | Unlike original patent claim 10, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 10, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 11 | 83 | Unlike original patent claim 11, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 11, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 12 | 83 | Unlike original patent claim 12, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 12, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 13 | 83 | Unlike original patent claim 13, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 13, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 14 | 83 | Unlike original patent claim 14, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 14, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 15 | 83 | Unlike original patent claim 15, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 15, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 16 | 83 | Unlike original patent claim 16, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane, " and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 16, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 17 | 83 | Unlike original patent claim 17, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 17, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |
| 18 | 83 | Unlike original patent claim 18, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 18, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor further comprises: first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conductive material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said protonic conductive electrolyte membrane; means for applying a DC power across the membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across the membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across the membrane applies a DC power to the first and second pump electrodes. |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 19 | 83 | Unlike original patent claim 19, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 19, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise carbon." |
| 20 | 83 | Unlike original patent claim 20, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 20, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 21 | 83 | Unlike original patent claim 21, presented reissue claim 83 recites the language “the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane.”<br><br>Unlike original patent claim 21, presented reissue claim 83 does not recite the language “quantitative measurement,” and also does not recite the language “wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise conductive metal oxides.” |
| 22 | 83 | Unlike original patent claim 22, presented reissue claim 83 recites the language “the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane.”<br><br>Unlike original patent claim 22, presented reissue claim 83 does not recite the language “quantitative measurement,” and also does not recite the language “wherein the first and second pumping electrodes have a diameter of about 10 mm, and the first protonic conductive electrolyte membrane has a thickness of about 0.17 mm.” |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 23 | 83 | Unlike original patent claim 23, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 23, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said first and second pumping electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 24 | 83 | Unlike original patent claim 24, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 24, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the first and second pumping electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 25 | 83 | Unlike original patent claim 25, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 25, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the first pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the first pumping electrode is 10 to 50 wt% of platinum." |
| 26 | 83 | Unlike original patent claim 26, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 26, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the second pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the second pumping electrode is 10 to 50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 27 | 83 | Unlike original patent claim 27, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 27, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor further comprises: a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; means for applying a DC power across said second protonic electrolyte membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across said second protonic electrolyte membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across said second protonic electrolyte membrane applies a DC power to the first and second pump electrodes. |
| 28 | 83 | Unlike original patent claim 28, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 28, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the second protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 29 | 83 | Unlike original patent claim 29, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 29, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the second protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 30 | 83 | Unlike original patent claim 30, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 30, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "said sensing and counter electrodes having electrically connected therebetween said means for electrical measurement; means for applying a DC pulse power source across the membrane; said sensing and counter electrodes having in electrical connection therebetween said means for applying DC pulse power across the membrane; and switch means for alternating the connection between the sensing and counter electrodes from the electrical measurement means to the means for applying a DC pulse power source across the membrane; when said switch means connects said electrical measurement means to the sensing and counter electrodes; and whereby said means for applying a DC pulse power source across the membrane moves CO away from a side of the gas sensor where the counter electrode is placed when said switch means connects said means for applying a DC pulse power source across the membrane to the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 31 | 83 | Unlike original patent claim 31, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 31, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 32 | 83 | Unlike original patent claim 32, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 32, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 33 | 83 | Unlike original patent claim 33, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 33, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 34 | 83 | Unlike original patent claim 34, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 34, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 35 | 83 | Unlike original patent claim 35, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 35, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 36 | 83 | Unlike original patent claim 36, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 36, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 37 | 83 | Unlike original patent claim 37, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 37, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "rein the electrochemical gas sensor is adapted to detect hydrogen." |
| 38 | 83 | Unlike original patent claim 38, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 38, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 39 | 83 | Unlike original patent claim 39, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 39, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |
| 40 | 83 | Unlike original patent claim 40, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 40, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 41 | 83 | Unlike original patent claim 41, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 41, presented reissue claim 83 does not recite the language "quantitative measurement." |
| 42 | 83 | Unlike original patent claim 42, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 42, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 43 | 83 | Unlike original patent claim 43, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 43, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 44 | 83 | Unlike original patent claim 44, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 44, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 45 | 83 | Unlike original patent claim 45, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 45, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 46 | 83 | Unlike original patent claim 46, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 46, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 47 | 83 | Unlike original patent claim 47, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 47, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes, each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; said first porous pump electrode being exposed to a chamber sealed off from the ambient atmosphere; said second porous pump electrode being separated from said counter electrode by a perforated support structure composed of an electrical conducting material, both said second porous pump electrode and said counter electrode being in contact with said perforated support structure; means for electrical measurement in electrical contact with said sensing electrode and perforated support structure; means for applying a DC power across said second protonic electrolyte membrane in electrical contact with said first pump electrode and said perforated support structure; whereby the gas is transported away from the counter electrode when the means for applying a DC power across said second protonic electrolyte membrane applies a DC power across said second protonic electrolyte membrane; and whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 48 | 83 | Unlike original patent claim 48, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 48, presented reissue claim 83 does not recite the language "quantitative measurement." |
| 49 | 83 | Unlike original patent claim 49, presented reissue claim 83 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 49, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 50 | 83 | Unlike original patent claim 50, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike, original patent claim 50, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 51 | 83 | Unlike original patent claim 51, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 51, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 52 | 83 | Unlike original patent claim 52, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike, original patent claim 52, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 53 | 83 | Unlike original patent claim 53, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 53, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter-reference electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 54 | 83 | Unlike original patent claim 54, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike, original patent claim 54, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |
| 55 | 83 | Unlike original patent claim 55, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 55, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 56 | 83 | Unlike original patent claim 56, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike, original patent claim 56, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 57 | 83 | Unlike original patent claim 57, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 57, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 58 | 83 | Unlike original patent claim 58, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike, original patent claim 58, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 59 | 83 | Unlike original patent claim 59, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 59, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "a porous mixed ionic-electronic conductive reference electrode having both an electronic conducting material and an ionic conducting material" and does not recite the language "a protonic conductive electrolyte membrane, having top and bottom sides, said top side of said protonic conductive membrane being in contact with the counter electrode and the reference electrode, the bottom side of said protonic conductive membrane being in contact with the sensing electrode; the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode; means for electrical measurement in electrical contact between the sensing electrode and the counter electrode; means for applying a DC power across said protonic electrolyte membrane in electrical contact between the sensing electrode and said reference electrode; whereby the gas is transported away from the reference electrode when the means for applying a DC power across said protonic electrolyte membrane applies a DC power across said protonic electrolyte membrane." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 60 | 83 | Unlike original patent claim 60, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike, original patent claim 60, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing, count and reference electrodes comprise carbon." |
| 61 | 83 | Unlike original patent claim 61, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 61, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing, count and reference electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 62 | 83 | Unlike original patent claim 62, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike, original patent claim 62, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing, counter and reference electrodes comprise conductive metal oxides." |
| 63 | 83 | Unlike original patent claim 63, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 63, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 64 | 83 | Unlike original patent claim 64, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike, original patent claim 64, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing, counter and reference electrodes comprise conductive metal oxides." |
| 65 | 83 | Unlike original patent claim 65, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 65, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 66 | 83 | Unlike original patent claim 66, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means, and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike, original patent claim 66, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 67 | 83 | Unlike original patent claim 67, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 67, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 68 | 83 | Unlike original patent claim 68, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike, original patent claim 68, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 69 | 83 | Unlike original patent claim 69, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 69, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 70 | 83 | Unlike original patent claim 70, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike, original patent claim 70, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing, counter and reference electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 71 | 83 | Unlike original patent claim 71, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 71, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing, counter and reference electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 72 | 83 | Unlike original patent claim 72, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike, original patent claim 72, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the sensing, counter and reference electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 73 | 83 | Unlike original patent claim 73, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 73, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 74 | 83 | Unlike original patent claim 74, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter. electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike, original patent claim 74, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter and reference electrodes is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter and reference electrodes is 1-50 wt% of Ru oxide." |
| 75 | 83 | Unlike original patent claim 75, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 75, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 76 | 83 | Unlike original patent claim 76, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike, original patent claim 76, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |
| 77 | 83 | Unlike original patent claim 77, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike original patent claim 77, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing, counter, first pumping, and second pumping electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, first pumping, and second pumping electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 78 | 83 | Unlike original patent claim 78, presented reissue claim 83 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane."<br><br>Unlike, original patent claim 78, presented reissue claim 83 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing, counter, and reference electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, and reference electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 1 | 84 | Unlike original patent claim 1, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 1, presented reissue claim 84 does not recite the language "quantitative measurement." |
| 2 | 84 | Unlike original patent claim 2, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 2, presented reissue claim 84 does not recite the language "quantitative measurement," does not recite the language "means for applying DC power across the protonic conductive electrolyte membrane; an electrical connection between the sensing electrode, the counter electrode, and the means for applying DC power across the protonic conductive electrolyte membrane; and switch means for alternating an electrical connection between the sensing electrode and counter electrode from the electrical measurement means to the means for applying DC power across the protonic conductive electrolyte membrane; whereby the gas is transported away from the counter electrode when the means for applying DC power across the protonic conductive electrolyte membrane applies a DC power to the sensing and counter electrodes." |
| 3 | 84 | Unlike original patent claim 3, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 3, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 4 | 84 | Unlike original patent claim 4, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 4, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 5 | 84 | Unlike original patent claim 5, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 5, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 6 | 84 | Unlike original patent claim 6, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 6, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 7 | 84 | Unlike original patent claim 7, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 7, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 8 | 84 | Unlike original patent claim 8, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 8, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 9 | 84 | Unlike original patent claim 9, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 9, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 10 | 84 | Unlike original patent claim 10, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 10, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 11 | 84 | Unlike original patent claim 11, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 11, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 12 | 84 | Unlike original patent claim 12, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 12, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 13 | 84 | Unlike original patent claim 13, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 13, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 14 | 84 | Unlike original patent claim 14, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 14, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 15 | 84 | Unlike original patent claim 15, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 15, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 16 | 84 | Unlike original patent claim 16, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 16, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 17 | 84 | Unlike original patent claim 17, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 17, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |
| 18 | 84 | Unlike original patent claim 18, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane, " and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 18, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor further comprises: first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conductive material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said protonic conductive electrolyte membrane; means for applying a DC power across the membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across the membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across the membrane applies a DC power to the first and second pump electrodes. |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 19 | 84 | Unlike original patent claim 19, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 19, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise carbon." |
| 20 | 84 | Unlike original patent claim 20, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 20, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 21 | 84 | Unlike original patent claim 21, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 21, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise conductive metal oxides." |
| 22 | 84 | Unlike original patent claim 22, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 22, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the first and second pumping electrodes have a diameter of about 10 mm, and the first protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 23 | 84 | Unlike original patent claim 23, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 23, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said first and second pumping electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 24 | 84 | Unlike original patent claim 24, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 24, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the first and second pumping electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 25 | 84 | Unlike original patent claim 25, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 25, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the first pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the first pumping electrode is 10 to 50 wt% of platinum." |
| 26 | 84 | Unlike original patent claim 26, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 26, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the second pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the second pumping electrode is 10 to 50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 27 | 84 | Unlike original patent claim 27, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane, " and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 27, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor further comprises: a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; means for applying a DC power across said second protonic electrolyte membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across said second protonic electrolyte membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across said second protonic electrolyte membrane applies a DC power to the first and second pump electrodes. |
| 28 | 84 | Unlike original patent claim 28, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane, " and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 28, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the second protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 29 | 84 | Unlike original patent claim 29, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 29, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the second protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 30 | 84 | Unlike original patent claim 30, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 30, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "said sensing and counter electrodes having electrically connected therebetween said means for electrical measurement; means for applying a DC pulse power source across the membrane; said sensing and counter electrodes having in electrical connection therebetween said means for applying DC pulse power across the membrane; and switch means for alternating the connection between the sensing and counter electrodes from the electrical measurement means to the means for applying a DC pulse power source across the membrane; when said switch means connects said electrical measurement means to the sensing and counter electrodes; and whereby said means for applying a DC pulse power source across the membrane moves CO away from a side of the gas sensor where the counter electrode is placed when said switch means connects said means for applying a DC pulse power source across the membrane to the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 31 | 84 | Unlike original patent claim 31, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 31, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 32 | 84 | Unlike original patent claim 32, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means,," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 32, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 33 | 84 | Unlike original patent claim 33, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 33, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 34 | 84 | Unlike original patent claim 34, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 34, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 35 | 84 | Unlike original patent claim 35, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 35, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 36 | 84 | Unlike original patent claim 36, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 36, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 37 | 84 | Unlike original patent claim 37, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 37, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "rein the electrochemical gas sensor is adapted to detect hydrogen." |
| 38 | 84 | Unlike original patent claim 38, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 38, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 39 | 84 | Unlike original patent claim 39, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 39, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |
| 40 | 84 | Unlike original patent claim 40, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means" and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 40, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 41 | 84 | Unlike original patent claim 41, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 41, presented reissue claim 84 does not recite the language "quantitative measurement." |
| 42 | 84 | Unlike original patent claim 42, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 42, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 43 | 84 | Unlike original patent claim 43, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 43, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 44 | 84 | Unlike original patent claim 44, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 44, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 45 | 84 | Unlike original patent claim 45, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 45, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 46 | 84 | Unlike original patent claim 46, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 46, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 47 | 84 | Unlike original patent claim 47, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 47, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes, each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; said first porous pump electrode being exposed to a chamber sealed off from the ambient atmosphere; said second porous pump electrode being separated from said counter electrode by a perforated support structure composed of an electrical conducting material, both said second porous pump electrode and said counter electrode being in contact with said perforated support structure; means for electrical measurement in electrical contact with said sensing electrode and perforated support structure; means for applying a DC power across said second protonic electrolyte membrane in electrical contact with said first pump electrode and said perforated support structure; whereby the gas is transported away from the counter electrode when the means for applying a DC power across said second protonic electrolyte membrane applies a DC power across said second protonic electrolyte membrane; and whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 48 | 84 | Unlike original patent claim 48, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 48, presented reissue claim 84 does not recite the language "quantitative measurement." |
| 49 | 84 | Unlike original patent claim 49, presented reissue claim 84 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 49, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 50 | 84 | Unlike original patent claim 50, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 50, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 51 | 84 | Unlike original patent claim 51, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 51, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 52 | 84 | Unlike original patent claim 52, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 52, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 53 | 84 | Unlike original patent claim 53, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 53, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter-reference electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 54 | 84 | Unlike original patent claim 54, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 54, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |
| 55 | 84 | Unlike original patent claim 55, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 55, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 56 | 84 | Unlike original patent claim 56, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 56, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 57 | 84 | Unlike original patent claim 57, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 57, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 58 | 84 | Unlike original patent claim 58, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 58, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 59 | 84 | Unlike original patent claim 59, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 59, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "a porous mixed ionic-electronic conductive reference electrode having both an electronic conducting material and an ionic conducting material" and does not recite the language "a protonic conductive electrolyte membrane, having top and bottom sides, said top side of said protonic conductive membrane being in contact with the counter electrode and the reference electrode, the bottom side of said protonic conductive membrane being in contact with the sensing electrode; the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode; means for electrical measurement in electrical contact between the sensing electrode and the counter electrode; means for applying a DC power across said protonic electrolyte membrane in electrical contact between the sensing electrode and said reference electrode; whereby the gas is transported away from the reference electrode when the means for applying a DC power across said protonic electrolyte membrane applies a DC power across said protonic electrolyte membrane." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 60 | 84 | Unlike original patent claim 60, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 60, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing, count and reference electrodes comprise carbon." |
| 61 | 84 | Unlike original patent claim 61, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 61, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing, count and reference electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 62 | 84 | Unlike original patent claim 62, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 62, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing, counter and reference electrodes comprise conductive metal oxides." |
| 63 | 84 | Unlike original patent claim 63, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 63, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 64 | 84 | Unlike original patent claim 64, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 64, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing, counter and reference electrodes comprise conductive metal oxides." |
| 65 | 84 | Unlike original patent claim 65, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 65, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 66 | 84 | Unlike original patent claim 66, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 66, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 67 | 84 | Unlike original patent claim 67, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 67, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 68 | 84 | Unlike original patent claim 68, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 68, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 69 | 84 | Unlike original patent claim 69, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 69, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 70 | 84 | Unlike original patent claim 70, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 70, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing, counter and reference electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 71 | 84 | Unlike original patent claim 71, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 71, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing, counter and reference electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 72 | 84 | Unlike original patent claim 72, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 72, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the sensing, counter and reference electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 73 | 84 | Unlike original patent claim 73, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 73, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 74 | 84 | Unlike original patent claim 74, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 74, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter and reference electrodes is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter and reference electrodes is 1-50 wt% of Ru oxide." |
| 75 | 84 | Unlike original patent claim 75, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 75, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 76 | 84 | Unlike original patent claim 76, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 76, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |
| 77 | 84 | Unlike original patent claim 77, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 77, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing, counter, first pumping, and second pumping electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, first pumping, and second pumping electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 78 | 84 | Unlike original patent claim 78, presented reissue claim 84 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 78, presented reissue claim 84 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing, counter, and reference electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, and reference electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 1 | 85 | Unlike original patent claim 1, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 1, presented reissue claim 85 does not recite the language "quantitative measurement." |
| 2 | 85 | Unlike original patent claim 2, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 2, presented reissue claim 85 does not recite the language "quantitative measurement," does not recite the language "means for applying DC power across the protonic conductive electrolyte membrane; an electrical connection between the sensing electrode, the counter electrode, and the means for applying DC power across the protonic conductive electrolyte membrane; and switch means for alternating an electrical connection between the sensing electrode and counter electrode from the electrical measurement means to the means for applying DC power across the protonic conductive electrolyte membrane; whereby the gas is transported away from the counter electrode when the means for applying DC power across the protonic conductive electrolyte membrane applies a DC power to the sensing and counter electrodes." |
| 3 | 85 | Unlike original patent claim 3, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 3, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 4 | 85 | Unlike original patent claim 4, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 4, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 5 | 85 | Unlike original patent claim 5, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 5, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides," |
| 6 | 85 | Unlike original patent claim 6, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 6, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 7 | 85 | Unlike original patent claim 7, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 7, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 8 | 85 | Unlike original patent claim 8, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 8, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 9 | 85 | Unlike original patent claim 9, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 9, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 10 | 85 | Unlike original patent claim 10, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 10, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 11 | 85 | Unlike original patent claim 11, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 11, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 12 | 85 | Unlike original patent claim 12, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 12, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 13 | 85 | Unlike original patent claim 13, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 13, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 14 | 85 | Unlike original patent claim 14, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 14, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 15 | 85 | Unlike original patent claim 15, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 15, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 16 | 85 | Unlike original patent claim 16, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane, " and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 16, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 17 | 85 | Unlike original patent claim 17, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 17, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |
| 18 | 85 | Unlike original patent claim 18, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 18, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor further comprises: first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conductive material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said protonic conductive electrolyte membrane; means for applying a DC power across the membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across the membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across the membrane applies a DC power to the first and second pump electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 19 | 85 | Unlike original patent claim 19, presented reissue claim 85 recites the language “the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode.”<br><br>Unlike original patent claim 19, presented reissue claim 85 does not recite the language “quantitative measurement,” and also does not recite the language “wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise carbon.” |
| 20 | 85 | Unlike original patent claim 20, presented reissue claim 85 recites the language “the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode.”<br><br>Unlike original patent claim 20, presented reissue claim 85 does not recite the language “quantitative measurement,” and also does not recite the language “wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise noble metals.” |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 21 | 85 | Unlike original patent claim 21, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 21, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise conductive metal oxides." |
| 22 | 85 | Unlike original patent claim 22, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 22, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the first and second pumping electrodes have a diameter of about 10 mm, and the first protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 23 | 85 | Unlike original patent claim 23, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 23, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said first and second pumping electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 24 | 85 | Unlike original patent claim 24, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 24, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the first and second pumping electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 25 | 85 | Unlike original patent claim 25, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 25, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the first pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the first pumping electrode is 10 to 50 wt% of platinum." |
| 26 | 85 | Unlike original patent claim 26, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 26, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the second pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the second pumping electrode is 10 to 50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 27 | 85 | Unlike original patent claim 27, presented reissue claim 85 recites the language “the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode.”<br><br>Unlike original patent claim 27, presented reissue claim 85 does not recite the language “quantitative measurement,” and also does not recite the language “wherein the electrochemical gas sensor further comprises: a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; means for applying a DC power across said second protonic electrolyte membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across said second protonic electrolyte membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across said second protonic electrolyte membrane applies a DC power to the first and second pump electrodes. |
| 28 | 85 | Unlike original patent claim 28, presented reissue claim 85 recites the language “the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode.”<br><br>Unlike original patent claim 28, presented reissue claim 85 does not recite the language “quantitative measurement,” and also does not recite the language “wherein the second protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer.” |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 29 | 85 | Unlike original patent claim 29, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 29, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the second protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 30 | 85 | Unlike original patent claim 30, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 30, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "said sensing and counter electrodes having electrically connected therebetween said means for electrical measurement; means for applying a DC pulse power source across the membrane; said sensing and counter electrodes having in electrical connection therebetween said means for applying DC pulse power across the membrane; and switch means for alternating the connection between the sensing and counter electrodes from the electrical measurement means to the means for applying a DC pulse power source across the membrane; when said switch means connects said electrical measurement means to the sensing and counter electrodes; and whereby said means for applying a DC pulse power source across the membrane moves CO away from a side of the gas sensor where the counter electrode is placed when said switch means connects said means for applying a DC pulse power source across the membrane to the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 31 | 85 | Unlike original patent claim 31, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 31, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 32 | 85 | Unlike original patent claim 32, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 32, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 33 | 85 | Unlike original patent claim 33, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 33, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 34 | 85 | Unlike original patent claim 34, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 34, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 35 | 85 | Unlike original patent claim 35, presented reissue claim 85 recites the language “a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm,” recites the language “the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane,” and also recites the language “said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means,” and also recites the language “in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode.”<br><br>Unlike original patent claim 35, presented reissue claim 85 does not recite the language “quantitative measurement,” and also does not recite the language “wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane.” |
| 36 | 85 | Unlike original patent claim 36, presented reissue claim 85 recites the language “a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm,” recites the language “the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane,” and also recites the language “said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means,” and also recites the language “in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode.”<br><br>Unlike original patent claim 36, presented reissue claim 85 does not recite the language “quantitative measurement,” and also does not recite the language “wherein the electrochemical gas sensor is adapted to detect CO.” |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 37 | 85 | Unlike original patent claim 37, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 37, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "rein the electrochemical gas sensor is adapted to detect hydrogen." |
| 38 | 85 | Unlike original patent claim 38, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 38, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 39 | 85 | Unlike original patent claim 39, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 39, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |
| 40 | 85 | Unlike original patent claim 40, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 40, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 41 | 85 | Unlike original patent claim 41, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 41, presented reissue claim 85 does not recite the language "quantitative measurement." |
| 42 | 85 | Unlike original patent claim 42, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 42, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 43 | 85 | Unlike original patent claim 43, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 43, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 44 | 85 | Unlike original patent claim 44, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 44, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 45 | 85 | Unlike original patent claim 45, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 45, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 46 | 85 | Unlike original patent claim 46, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 46, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 47 | 85 | Unlike original patent claim 47, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 47, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes, each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; said first porous pump electrode being exposed to a chamber sealed off from the ambient atmosphere; said second porous pump electrode being separated from said counter electrode by a perforated support structure composed of an electrical conducting material, both said second porous pump electrode and said counter electrode being in contact with said perforated support structure; means for electrical measurement in electrical contact with said sensing electrode and perforated support structure; means for applying a DC power across said second protonic electrolyte membrane in electrical contact with said first pump electrode and said perforated support structure; whereby the gas is transported away from the counter electrode when the means for applying a DC power across said second protonic electrolyte membrane applies a DC power across said second protonic electrolyte membrane; and whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 48 | 85 | Unlike original patent claim 48, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 48, presented reissue claim 85 does not recite the language "quantitative measurement." |
| 49 | 85 | Unlike original patent claim 49, presented reissue claim 85 recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane, and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 49, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 50 | 85 | Unlike original patent claim 50, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 50, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 51 | 85 | Unlike original patent claim 51, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 51, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 52 | 85 | Unlike original patent claim 52, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 52, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 53 | 85 | Unlike original patent claim 53, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 53, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter-reference electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 54 | 85 | Unlike original patent claim 54, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 54, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |
| 55 | 85 | Unlike original patent claim 55, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 55, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 56 | 85 | Unlike original patent claim 56, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane;" and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 56, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 57 | 85 | Unlike original patent claim 57, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 57, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 58 | 85 | Unlike original patent claim 58, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 58, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 59 | 85 | Unlike original patent claim 59, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 59, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "a porous mixed ionic-electronic conductive reference electrode having both an electronic conducting material and an ionic conducting material" and does not recite the language "a protonic conductive electrolyte membrane, having top and bottom sides, said top side of said protonic conductive membrane being in contact with the counter electrode and the reference electrode, the bottom side of said protonic conductive membrane being in contact with the sensing electrode; the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode; means for electrical measurement in electrical contact between the sensing electrode and the counter electrode; means for applying a DC power across said protonic electrolyte membrane in electrical contact between the sensing electrode and said reference electrode; whereby the gas is transported away from the reference electrode when the means for applying a DC power across said protonic electrolyte membrane applies a DC power across said protonic electrolyte membrane." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 60 | 85 | Unlike original patent claim 60, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 60, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing, count and reference electrodes comprise carbon." |
| 61 | 85 | Unlike original patent claim 61, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 61, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing, count and reference electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 62 | 85 | Unlike original patent claim 62, presented reissue claim 85 recites the language “a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm,” recites the language “the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane,” and also recites the language “said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means,” and also recites the language “in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode.”<br><br>Unlike, original patent claim 62, presented reissue claim 85 does not recite the language “quantitative measurement,” and also does not recite the language “wherein said sensing, counter and reference electrodes comprise conductive metal oxides.” |
| 63 | 85 | Unlike original patent claim 63, presented reissue claim 85 recites the language “a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm,” recites the language “the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane,” and also recites the language “said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means,” and also recites the language “in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane,” and also recites the language “in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode.”<br><br>Unlike original patent claim 63, presented reissue claim 85 does not recite the language “quantitative measurement,” and also does not recite the language “wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer.” |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 64 | 85 | Unlike original patent claim 64, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 64, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein said sensing, counter and reference electrodes comprise conductive metal oxides." |
| 65 | 85 | Unlike original patent claim 65, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 65, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 66 | 85 | Unlike original patent claim 66, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means, and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 66, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 67 | 85 | Unlike original patent claim 67, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane" and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 67, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 68 | 85 | Unlike original patent claim 68, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 68, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 69 | 85 | Unlike original patent claim 69, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 69, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 70 | 85 | Unlike original patent claim 70, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 70, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing, counter and reference electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 71 | 85 | Unlike original patent claim 71, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 71, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the electronic and ionic conducting materials of said sensing, counter and reference electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 72 | 85 | Unlike original patent claim 72, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 72, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the proton conductor material for both the sensing, counter and reference electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 73 | 85 | Unlike original patent claim 73, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 73, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 74 | 85 | Unlike original patent claim 74, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 74, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein one of the first and second electrical conductor materials for the counter and reference electrodes is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter and reference electrodes is 1-50 wt% of Ru oxide." |
| 75 | 85 | Unlike original patent claim 75, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 75, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 76 | 85 | Unlike original patent claim 76, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 76, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |
| 77 | 85 | Unlike original patent claim 77, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike original patent claim 77, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing, counter, first pumping, and second pumping electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, first pumping, and second pumping electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 78 | 85 | Unlike original patent claim 78, presented reissue claim 85 recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," recites the language "the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane," and also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "in which the sensing electrode reacts with the gas in the absence of an applied voltage to the sensing electrode."<br><br>Unlike, original patent claim 78, presented reissue claim 85 does not recite the language "quantitative measurement," and also does not recite the language "wherein the sensing, counter, and reference electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, and reference electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 1 | 86 | Unlike original patent claim 1, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 1, original reissue claim 86 does not recite the language "quantitative measurement." |
| 2 | 86 | Unlike original patent claim 2, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 2, presented reissue claim 86 does not recite the language "quantitative measurement," does not recite the language "means for applying DC power across the protonic conductive electrolyte membrane; an electrical connection between the sensing electrode, the counter electrode, and the means for applying DC power across the protonic conductive electrolyte membrane; and switch means for alternating an electrical connection between the sensing electrode and counter electrode from the electrical measurement means to the means for applying DC power across the protonic conductive electrolyte membrane; whereby the gas is transported away from the counter electrode when the means for applying DC power across the protonic conductive electrolyte membrane applies a DC power to the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 3 | 86 | Unlike original patent claim 3, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 3, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 4 | 86 | Unlike original patent claim 4, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 4, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 5 | 86 | Unlike original patent claim 5, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 5, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 6 | 86 | Unlike original patent claim 6, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 6, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 7 | 86 | Unlike original patent claim 7, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 7, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 8 | 86 | Unlike original patent claim 8, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 8, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 9 | 86 | Unlike original patent claim 9, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 9, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 10 | 86 | Unlike original patent claim 10, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 10, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 11 | 86 | Unlike original patent claim 11, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 11, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 12 | 86 | Unlike original patent claim 12, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 12, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 13 | 86 | Unlike original patent claim 13, presented reissue claim 86 recites the language “a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere,” and also recites the language “said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage.”<br><br>Unlike original patent claim 13, presented reissue claim 86 does not recite the language “quantitative measurement,” and does not recite the language “wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm.” |
| 14 | 86 | Unlike original patent claim 14, presented reissue claim 86 recites the language “a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere,” and also recites the language “said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage.”<br><br>Unlike original patent claim 14, presented reissue claim 86 does not recite the language “quantitative measurement,” and does not recite the language “wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials.” |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 15 | 86 | Unlike original patent claim 15, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 15, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 16 | 86 | Unlike original patent claim 16, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 16, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 17 | 86 | Unlike original patent claim 17, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 17, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |
| 18 | 86 | Unlike original patent claim 18, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 18, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor further comprises: first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conductive material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said protonic conductive electrolyte membrane; means for applying a DC power across the membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across the membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across the membrane applies a DC power to the first and second pump electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 19 | 86 | Unlike original patent claim 19, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 19, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise carbon." |
| 20 | 86 | Unlike original patent claim 20, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 20, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 21 | 86 | Unlike original patent claim 21, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 21, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise conductive metal oxides." |
| 22 | 86 | Unlike original patent claim 22, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 22, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the first and second pumping electrodes have a diameter of about 10 mm, and the first protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 23 | 86 | Unlike original patent claim 23, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 23, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of said first and second pumping electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 24 | 86 | Unlike original patent claim 24, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 24, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the proton conductor material for both the first and second pumping electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 25 | 86 | Unlike original patent claim 25, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 25, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the first pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the first pumping electrode is 10 to 50 wt% of platinum." |
| 26 | 86 | Unlike original patent claim 26, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 26, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the second pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the second pumping electrode is 10 to 50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 27 | 86 | Unlike original patent claim 27, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 27, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor further comprises: a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; means for applying a DC power across said second protonic electrolyte membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across said second protonic electrolyte membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across said second protonic electrolyte membrane applies a DC power to the first and second pump electrodes." |
| 28 | 86 | Unlike original patent claim 28, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 28, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the second protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 29 | 86 | Unlike original patent claim 29, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 29, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the second protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 30 | 86 | Unlike original patent claim 30, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 30, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "means for applying a DC pulse power source across the membrane; said sensing and counter electrodes having in electrical connection therebetween said means for applying DC pulse power across the membrane; and switch means for alternating the connection between the sensing and counter electrodes from the electrical measurement means to the means for applying a DC pulse power source across the membrane; whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic when said switch means connects said electrical measurement means to the sensing and counter electrodes; and whereby said means for applying a DC pulse power source across the membrane moves CO away from a side of the gas sensor where the counter electrode is placed when said switch means connects said means for applying a DC pulse power source across the membrane to the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 31 | 86 | Unlike original patent claim 31, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 31, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 32 | 86 | Unlike original patent claim 32, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 32, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 33 | 86 | Unlike original patent claim 33, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 33, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 34 | 86 | Unlike original patent claim 34, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 34, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 35 | 86 | Unlike original patent claim 35, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 35, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 36 | 86 | Unlike original patent claim 36, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 36, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 37 | 86 | Unlike original patent claim 37, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 37, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |
| 38 | 86 | Unlike original patent claim 38, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 38, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 39 | 86 | Unlike original patent claim 39, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 39, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |
| 40 | 86 | Unlike original patent claim 40, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 40, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 41 | 86 | Unlike original patent claim 41, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 41, original reissue claim 86 does not recite the language "quantitative measurement." |
| 42 | 86 | Unlike original patent claim 42, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 42, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 43 | 86 | Unlike original patent claim 43, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 43, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 44 | 86 | Unlike original patent claim 44, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 44, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 45 | 86 | Unlike original patent claim 45, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 45, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 46 | 86 | Unlike original patent claim 46, presented reissue claim 86 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 46, presented reissue claim 86 does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 47 | 86 | Unlike original patent claim 47, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 47, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes, each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; said first porous pump electrode being exposed to a chamber sealed off from the ambient atmosphere; said second porous pump electrode being separated from said counter electrode by a perforated support structure composed of an electrical conducting material, both said second porous pump electrode and said counter electrode being in contact with said perforated support structure; means for electrical measurement in electrical contact with said sensing electrode and perforated support structure; means for applying a DC power across said second protonic electrolyte membrane in electrical contact with said first pump electrode and said perforated support structure; whereby the gas is transported away from the counter electrode when the means for applying a DC power across said second protonic electrolyte membrane applies a DC power across said second protonic electrolyte membrane; and whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic. |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 48 | 86 | Unlike original patent claim 48, presented reissue claim 86 recites the language “a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere,” and also recites the language “said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage.”<br><br>Unlike original patent claim 48, presented reissue claim 86 does not recite the language “quantitative measurement.” |
| 49 | 86 | Unlike original patent claim 49, presented reissue claim 86 recites the language “a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere,” and also recites the language “said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage.”<br><br>Unlike original patent claim 49, presented reissue claim 86 does not recite the language “quantitative measurement,” and does not recite the language “wherein the sensing and electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm.” |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 50 | 86 | Unlike original patent claim 50, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 50, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 51 | 86 | Unlike original patent claim 51, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 51, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 52 | 86 | Unlike original patent claim 52, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 52, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 53 | 86 | Unlike original patent claim 53, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 53, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter-reference electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 54 | 86 | Unlike original patent claim 54, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 54, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |
| 55 | 86 | Unlike original patent claim 55, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 55, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 56 | 86 | Unlike original patent claim 56, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 56, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 57 | 86 | Unlike original patent claim 57, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 57, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 58 | 86 | Unlike original patent claim 58, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 58, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 59 | 86 | Unlike original patent claim 59, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 59, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "a protonic conductive electrolyte membrane, having top and bottom sides, said top side of said protonic conductive membrane being in contact with the counter electrode and the reference electrode, the bottom side of said protonic conductive membrane being in contact with the sensing electrode; means for electrical measurement in electrical contact between the sensing electrode and the counter electrode; means for applying a DC power across said protonic electrolyte membrane in electrical contact between the sensing electrode and said reference electrode; whereby the gas is transported away from the reference electrode when the means for applying a DC power across said protonic electrolyte membrane applies a DC power across said protonic electrolyte membrane; and whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 60 | 86 | Unlike original patent claim 60, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 60, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing, count and reference electrodes comprise carbon." |
| 61 | 86 | Unlike original patent claim 61, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 61, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing, count and reference electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 62 | 86 | Unlike original patent claim 62, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 62, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing, counter and reference electrodes comprise conductive metal oxides." |
| 63 | 86 | Unlike original patent claim 63, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 63, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 64 | 86 | Unlike original patent claim 64, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 64, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 65 | 86 | Unlike original patent claim 65, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 65, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 66 | 86 | Unlike original patent claim 66, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 66, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 67 | 86 | Unlike original patent claim 67, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 67, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 68 | 86 | Unlike original patent claim 68, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 68, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 69 | 86 | Unlike original patent claim 69, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 69, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 70 | 86 | Unlike original patent claim 70, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 70, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the sensing, counter and reference electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 71 | 86 | Unlike original patent claim 71, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 71, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of said sensing, counter and reference electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 72 | 86 | Unlike original patent claim 72, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 72, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the proton conductor material for both the sensing, counter and reference electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 73 | 86 | Unlike original patent claim 73, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 73, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 74 | 86 | Unlike original patent claim 74, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 74, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the counter and reference electrodes is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter and reference electrodes is 1-50 wt% of Ru oxide." |
| 75 | 80 | Unlike original patent claim 75, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 75, presented reissue claim 86 does not recite the language "quantitative measurement," and does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 76 | 86 | Unlike original patent claim 76, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 76, presented reissue claim 86 does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |
| 77 | 86 | Unlike original patent claim 77, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 77, presented reissue claim 86 does not recite the language "wherein the sensing, counter, first pumping, and second pumping electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, first pumping, and second pumping electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 78 | 86 | Unlike original patent claim 78, presented reissue claim 86 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 78, presented reissue claim 86 does not recite the language "wherein the sensing, counter, and reference electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, and reference electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 1 | 87 | Unlike original patent claim 1, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 1, original reissue claim 87 does not recite the language "quantitative measurement." |
| 2 | 87 | Unlike original patent claim 2, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 2, presented reissue claim 87 does not recite the language "quantitative measurement," does not recite the language "means for applying DC power across the protonic conductive electrolyte membrane; an electrical connection between the sensing electrode, the counter electrode, and the means for applying DC power across the protonic conductive electrolyte membrane; and switch means for alternating an electrical connection between the sensing electrode and counter electrode from the electrical measurement means to the means for applying DC power across the protonic conductive electrolyte membrane; whereby the gas is transported away from the counter electrode when the means for applying DC power across the protonic conductive electrolyte membrane applies a DC power to the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 3 | 87 | Unlike original patent claim 3, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 3, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 4 | 87 | Unlike original patent claim 4, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 4, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 5 | 87 | Unlike original patent claim 5, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 5, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 6 | 87 | Unlike original patent claim 6, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 6, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 7 | 87 | Unlike original patent claim 7, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 7, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 8 | 87 | Unlike original patent claim 8, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 8, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 9 | 87 | Unlike original patent claim 9, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 9, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 10 | 87 | Unlike original patent claim 10, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 10, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 11 | 87 | Unlike original patent claim 11, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 11, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 12 | 87 | Unlike original patent claim 12, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 12, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 13 | 87 | Unlike original patent claim 13, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 13, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 14 | 87 | Unlike original patent claim 14, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 14, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 15 | 87 | Unlike original patent claim 15, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 15, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 16 | 87 | Unlike original patent claim 16, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 16, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 17 | 87 | Unlike original patent claim 17, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 17, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |
| 18 | 87 | Unlike original patent claim 18, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 18, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor further comprises: first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conductive material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said protonic conductive electrolyte membrane; means for applying a DC power across the membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across the membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across the membrane applies a DC power to the first and second pump electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 19 | 87 | Unlike original patent claim 19, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 19, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise carbon." |
| 20 | 87 | Unlike original patent claim 20, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 20, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 21 | 87 | Unlike original patent claim 21, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 21, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise conductive metal oxides." |
| 22 | 87 | Unlike original patent claim 22, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 22, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the first and second pumping electrodes have a diameter of about 10 mm, and the first protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 23 | 87 | Unlike original patent claim 23, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 23, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of said first and second pumping electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 24 | 87 | Unlike original patent claim 24, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 24, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the proton conductor material for both the first and second pumping electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 25 | 87 | Unlike original patent claim 25, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 25, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the first pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the first pumping electrode is 10 to 50 wt% of platinum." |
| 26 | 87 | Unlike original patent claim 26, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 26, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the second pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the second pumping electrode is 10 to 50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 27 | 87 | Unlike original patent claim 27, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 27, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor further comprises: a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; means for applying a DC power across said second protonic electrolyte membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across said second protonic electrolyte membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across said second protonic electrolyte membrane applies a DC power to the first and second pump electrodes." |
| 28 | 87 | Unlike original patent claim 28, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 28, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the second protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 29 | 87 | Unlike original patent claim 29, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 29, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the second protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 30 | 87 | Unlike original patent claim 30, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 30, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "means for applying a DC pulse power source across the membrane; said sensing and counter electrodes having in electrical connection therebetween said means for applying DC pulse power across the membrane; and switch means for alternating the connection between the sensing and counter electrodes from the electrical measurement means to the means for applying a DC pulse power source across the membrane; whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic when said switch means connects said electrical measurement means to the sensing and counter electrodes; and whereby said means for applying a DC pulse power source across the membrane moves CO away from a side of the gas sensor where the counter electrode is placed when said switch means connects said means for applying a DC pulse power source across the membrane to the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 31 | 87 | Unlike original patent claim 31, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 31, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 32 | 87 | Unlike original patent claim 32, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 32, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 33 | 87 | Unlike original patent claim 33, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 33, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 34 | 87 | Unlike original patent claim 34, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 34, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 35 | 87 | Unlike original patent claim 35, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 35, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 36 | 87 | Unlike original patent claim 36, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 36, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 37 | 87 | Unlike original patent claim 37, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 37, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |
| 38 | 87 | Unlike original patent claim 38, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 38, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 39 | 87 | Unlike original patent claim 39, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 39, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |
| 40 | 87 | Unlike original patent claim 40, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 40, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 41 | 87 | Unlike original patent claim 41, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 41, original reissue claim 87 does not recite the language "quantitative measurement." |
| 42 | 87 | Unlike original patent claim 42, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 42, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 43 | 87 | Unlike original patent claim 43, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 43, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 44 | 87 | Unlike original patent claim 44, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 44, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 45 | 87 | Unlike original patent claim 45, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 45, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 46 | 87 | Unlike original patent claim 46, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 46, presented reissue claim 87 does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 47 | 87 | Unlike original patent claim 47, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 47, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes, each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; said first porous pump electrode being exposed to a chamber sealed off from the ambient atmosphere; said second porous pump electrode being separated from said counter electrode by a perforated support structure composed of an electrical conducting material, both said second porous pump electrode and said counter electrode being in contact with said perforated support structure; means for electrical measurement in electrical contact with said sensing electrode and perforated support structure; means for applying a DC power across said second protonic electrolyte membrane in electrical contact with said first pump electrode and said perforated support structure; whereby the gas is transported away from the counter electrode when the means for applying a DC power across said second protonic electrolyte membrane applies a DC power across said second protonic electrolyte membrane; and whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic. |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 48 | 87 | Unlike original patent claim 48, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 48, presented reissue claim 87 does not recite the language "quantitative measurement." |
| 49 | 87 | Unlike original patent claim 49, presented reissue claim 87 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 49, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the sensing and electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 50 | 87 | Unlike original patent claim 50, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 50, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 51 | 87 | Unlike original patent claim 51, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 51, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 52 | 87 | Unlike original patent claim 52, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 52, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 53 | 87 | Unlike original patent claim 53, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 53, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter-reference electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 54 | 87 | Unlike original patent claim 54, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 54, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |
| 55 | 87 | Unlike original patent claim 55, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 55, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 56 | 87 | Unlike original patent claim 56, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 56, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 57 | 87 | Unlike original patent claim 57, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 57, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 58 | 87 | Unlike original patent claim 58, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 58, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 59 | 87 | Unlike original patent claim 59, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 59, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "a protonic conductive electrolyte membrane, having top and bottom sides, said top side of said protonic conductive membrane being in contact with the counter electrode and the reference electrode, the bottom side of said protonic conductive membrane being in contact with the sensing electrode; means for electrical measurement in electrical contact between the sensing electrode and the counter electrode; means for applying a DC power across said protonic electrolyte membrane in electrical contact between the sensing electrode and said reference electrode; whereby the gas is transported away from the reference electrode when the means for applying a DC power across said protonic electrolyte membrane applies a DC power across said protonic electrolyte membrane; and whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 60 | 87 | Unlike original patent claim 60, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 60, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing, count and reference electrodes comprise carbon." |
| 61 | 87 | Unlike original patent claim 61, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 61, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing, count and reference electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 62 | 87 | Unlike original patent claim 62, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 62, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing, counter and reference electrodes comprise conductive metal oxides." |
| 63 | 87 | Unlike original patent claim 63, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 63, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 64 | 87 | Unlike original patent claim 64, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 64, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 65 | 87 | Unlike original patent claim 65, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 65, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 66 | 87 | Unlike original patent claim 66, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 66, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 67 | 87 | Unlike original patent claim 67, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 67, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 68 | 87 | Unlike original patent claim 68, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 68, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 69 | 87 | Unlike original patent claim 69, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 69, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 70 | 87 | Unlike original patent claim 70, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 70, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the sensing, counter and reference electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 71 | 87 | Unlike original patent claim 71, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 71, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of said sensing, counter and reference electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 72 | 87 | Unlike original patent claim 72, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 72, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the proton conductor material for both the sensing, counter and reference electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 73 | 87 | Unlike original patent claim 73, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 73, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 74 | 87 | Unlike original patent claim 74, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 74, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the counter and reference electrodes is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter and reference electrodes is 1-50 wt% of Ru oxide." |
| 75 | 87 | Unlike original patent claim 75, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 75, presented reissue claim 87 does not recite the language "quantitative measurement," and does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 76 | 87 | Unlike original patent claim 76, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 76, presented reissue claim 87 does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |
| 77 | 87 | Unlike original patent claim 77, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 77, presented reissue claim 87 does not recite the language "wherein the sensing, counter, first pumping, and second pumping electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, first pumping, and second pumping electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 78 | 87 | Unlike original patent claim 78, presented reissue claim 87 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode and the counter electrode are the only two electrodes in contact with the first protonic conductive electrolyte membrane," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 78, presented reissue claim 87 does not recite the language "wherein the sensing, counter, and reference electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, and reference electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 1 | 88 | Unlike original patent claim 1, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 1, original reissue claim 88 does not recite the language "quantitative measurement." |
| 2 | 88 | Unlike original patent claim 2, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 2, presented reissue claim 88 does not recite the language "quantitative measurement," does not recite the language "means for applying DC power across the protonic conductive electrolyte membrane; an electrical connection between the sensing electrode, the counter electrode, and the means for applying DC power across the protonic conductive electrolyte membrane; and switch means for alternating an electrical connection between the sensing electrode and counter electrode from the electrical measurement means to the means for applying DC power across the protonic conductive electrolyte membrane; whereby the gas is transported away from the counter electrode when the means for applying DC power across the protonic conductive electrolyte membrane applies a DC power to the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 3 | 88 | Unlike original patent claim 3, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 3, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 4 | 88 | Unlike original patent claim 4, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 4, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
| --- | --- | --- |
| 5 | 88 | Unlike original patent claim 5, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 5, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 6 | 88 | Unlike original patent claim 6, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 6, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 7 | 88 | Unlike original patent claim 7, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 7, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 8 | 88 | Unlike original patent claim 8, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 8, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 9 | 88 | Unlike original patent claim 9, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 9, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 10 | 88 | Unlike original patent claim 10, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 10, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 11 | 88 | Unlike original patent claim 11, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 11, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 12 | 88 | Unlike original patent claim 12, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 12, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 13 | 88 | Unlike original patent claim 13, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 13, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 14 | 88 | Unlike original patent claim 14, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 14, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 15 | 88 | Unlike original patent claim 15, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 15, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 16 | 88 | Unlike original patent claim 16, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 16, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 17 | 88 | Unlike original patent claim 17, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 17, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |
| 18 | 88 | Unlike original patent claim 18, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 18, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor further comprises: first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conductive material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said protonic conductive electrolyte membrane; means for applying a DC power across the membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across the membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across the membrane applies a DC power to the first and second pump electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 19 | 88 | Unlike original patent claim 19, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 19, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise carbon." |
| 20 | 88 | Unlike original patent claim 20, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 20, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 21 | 88 | Unlike original patent claim 21, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 21, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of the first and second pumping electrodes comprise conductive metal oxides." |
| 22 | 88 | Unlike original patent claim 22, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 22, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the first and second pumping electrodes have a diameter of about 10 mm, and the first protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 23 | 88 | Unlike original patent claim 23, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 23, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of said first and second pumping electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 24 | 88 | Unlike original patent claim 24, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 24, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the proton conductor material for both the first and second pumping electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 25 | 88 | Unlike original patent claim 25, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 25, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the first pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the first pumping electrode is 10 to 50 wt% of platinum." |
| 26 | 88 | Unlike original patent claim 26, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 26, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the second pumping electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the second pumping electrode is 10 to 50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 27 | 88 | Unlike original patent claim 27, presented reissue claim 88recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 27, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor further comprises: a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; means for applying a DC power across said second protonic electrolyte membrane; said first and second pump electrodes having in electrical connection therebetween said means for applying DC power across said second protonic electrolyte membrane; whereby the gas is transported away from the counter electrode when said means for applying DC power across said second protonic electrolyte membrane applies a DC power to the first and second pump electrodes." |
| 28 | 88 | Unlike original patent claim 28, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 28, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the second protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 29 | 88 | Unlike original patent claim 29, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 29, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the second protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 30 | 88 | Unlike original patent claim 30, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 30, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "means for applying a DC pulse power source across the membrane; said sensing and counter electrodes having in electrical connection therebetween said means for applying DC pulse power across the membrane; and switch means for alternating the connection between the sensing and counter electrodes from the electrical measurement means to the means for applying a DC pulse power source across the membrane; whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic when said switch means connects said electrical measurement means to the sensing and counter electrodes; and whereby said means for applying a DC pulse power source across the membrane moves CO away from a side of the gas sensor where the counter electrode is placed when said switch means connects said means for applying a DC pulse power source across the membrane to the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 31 | 88 | Unlike original patent claim 31, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 31, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise carbon." |
| 32 | 88 | Unlike original patent claim 32, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 32, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 33 | 88 | Unlike original patent claim 33, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 33, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing and counter electrodes comprise conductive metal oxides." |
| 34 | 88 | Unlike original patent claim 34, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 34, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 35 | 88 | Unlike original patent claim 35, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 35, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 36 | 88 | Unlike original patent claim 36, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 36, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 37 | 88 | Unlike original patent claim 37, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 37, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |
| 38 | 88 | Unlike original patent claim 38, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 38, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 39 | 88 | Unlike original patent claim 39, presented reissue claim 88recites the language “a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere,” also recites the language “a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm,” also recites the language “said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means,” also recites the language “the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode,” and also recites the language “said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage.”<br><br>Unlike original patent claim 39, presented reissue claim 88does not recite the language “quantitative measurement,” and does not recite the language “wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor.” |
| 40 | 88 | Unlike original patent claim 40, presented reissue claim 88recites the language “a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere,” also recites the language “a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm,” also recites the language “said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means,” also recites the language “the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode,” and also recites the language “said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage.”<br><br>Unlike original patent claim 40, presented reissue claim 88does not recite the language “quantitative measurement,” and does not recite the language “wherein the electrochemical gas sensor is adapted to detect $NO_x$.” |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 41 | 88 | Unlike original patent claim 41, presented reissue claim 88recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 41, original reissue claim 88does not recite the language "quantitative measurement." |
| 42 | 88 | Unlike original patent claim 42, presented reissue claim 88recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 42, presented reissue claim 88does not recite the language "quantitative measurement," and does not recite the language "wherein the sensing and counter electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 43 | 88 | Unlike original patent claim 43, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 43, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 44 | 88 | Unlike original patent claim 44, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 44, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 45 | 88 | Unlike original patent claim 45, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 45, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 46 | 88 | Unlike original patent claim 46, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 46, presented reissue claim 88 does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 47 | 88 | Unlike original patent claim 47, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 47, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "a second protonic conductive electrolyte membrane; first and second porous mixed ionic-electronic conductive pump electrodes, each having both an electronic conductive material and an ionic conducting material, each of said first and second pump electrodes being separate from said sensing and counter electrodes and situated on opposite sides of and in contact with said second protonic conductive electrolyte membrane; said first porous pump electrode being exposed to a chamber sealed off from the ambient atmosphere; said second porous pump electrode being separated from said counter electrode by a perforated support structure composed of an electrical conducting material, both said second porous pump electrode and said counter electrode being in contact with said perforated support structure; means for electrical measurement in electrical contact with said sensing electrode and perforated support structure; means for applying a DC power across said second protonic electrolyte membrane in electrical contact with said first pump electrode and said perforated support structure; whereby the gas is transported away from the counter electrode when the means for applying a DC power across said second protonic electrolyte membrane applies a DC power across said second protonic electrolyte membrane; and whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic. |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 48 | 88 | Unlike original patent claim 48, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 48, presented reissue claim 88 does not recite the language "quantitative measurement." |
| 49 | 88 | Unlike original patent claim 49, presented reissue claim 88 recites the language "a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 49, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the sensing and electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 50 | 88 | Unlike original patent claim 50, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 50, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of said sensing and counter electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and a second electrical conductor materials." |
| 51 | 88 | Unlike original patent claim 51, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 51, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the proton conductor material for both the sensing and counter electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 52 | 88 | Unlike original patent claim 52, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 52, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |
| 53 | 88 | Unlike original patent claim 53, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 53, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the counter electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter-reference electrode is 1-50 wt% of Ru oxide." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 54 | 88 | Unlike original patent claim 54, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 54, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |
| 55 | 88 | Unlike original patent claim 55, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 55, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 56 | 88 | Unlike original patent claim 56, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 56, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 57 | 88 | Unlike original patent claim 57, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 57, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
|---|---|---|
| 58 | 88 | Unlike original patent claim 58, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm," also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 58, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 59 | 88 | Unlike original patent claim 59, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 59, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "a protonic conductive electrolyte membrane, having top and bottom sides, said top side of said protonic conductive membrane being in contact with the counter electrode and the reference electrode, the bottom side of said protonic conductive membrane being in contact with the sensing electrode; means for electrical measurement in electrical contact between the sensing electrode and the counter electrode; means for applying a DC power across said protonic electrolyte membrane in electrical contact between the sensing electrode and said reference electrode; whereby the gas is transported away from the reference electrode when the means for applying a DC power across said protonic electrolyte membrane applies a DC power across said protonic electrolyte membrane; and whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 60 | 88 | Unlike original patent claim 60, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 60, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing, count and reference electrodes comprise carbon." |
| 61 | 88 | Unlike original patent claim 61, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 61, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing, count and reference electrodes comprise noble metals." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 62 | 88 | Unlike original patent claim 62, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 62, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein said sensing, counter and reference electrodes comprise conductive metal oxides." |
| 63 | 88 | Unlike original patent claim 63, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 63, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is substantially comprised of a solid, perfluorinated, ion-exchange polymer." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 64 | 88 | Unlike original patent claim 64, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 64, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the protonic conductive electrolyte membrane is a metal oxide protonic conductor electrolyte membrane." |
| 65 | 88 | Unlike original patent claim 65, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 65, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect CO." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 66 | 88 | Unlike original patent claim 66, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 66, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $NO_x$." |
| 67 | 88 | Unlike original patent claim 67, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 67, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect hydrogen." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 68 | 88 | Unlike original patent claim 68, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 68, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2S$." |
| 69 | 88 | Unlike original patent claim 69, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 69, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electrochemical gas sensor is adapted to detect $H_2O$ vapor." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 70 | 88 | Unlike original patent claim 70, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 70, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the sensing, counter and reference electrodes have a diameter of about 10 mm, and the protonic conductive electrolyte membrane has a thickness of about 0.17 mm." |
| 71 | 88 | Unlike original patent claim 71, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 71, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the electronic and ionic conducting materials of said sensing, counter and reference electrodes are a proton-electron mixed conductive material having 10-50 wt% of a proton conductor material and 50-90 wt% of a first and second electrical conductor materials." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 72 | 88 | Unlike original patent claim 72, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 72, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the proton conductor material for both the sensing, counter and reference electrodes is a copolymer having a tetrafluorethylene backbone with a side chain of perfluorinated monomers containing at least one of a sulfonic acid group or a carboxylic acid group." |
| 73 | 88 | Unlike original patent claim 73, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 73, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the sensing electrode is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the sensing electrode is 1-50 wt% of platinum." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 74 | 88 | Unlike original patent claim 74, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 74, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein one of the first and second electrical conductor materials for the counter and reference electrodes is 50-99 wt% of carbon black, and the other of the first and second electrical conductor materials for the counter and reference electrodes is 1-50 wt% of Ru oxide." |
| 75 | 88 | Unlike original patent claim 75, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 75, presented reissue claim 88 does not recite the language "quantitative measurement," and does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 76 | 88 | Unlike original patent claim 76, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 76, presented reissue claim 88 does not recite the language "wherein the sensing and the counter electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing and counter electrodes." |
| 77 | 88 | Unlike original patent claim 77, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 77, presented reissue claim 88 does not recite the language "wherein the sensing, counter, first pumping, and second pumping electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, first pumping, and second pumping electrodes." |

| Original Patent Claim | Presented Reissue Claim | Differences in the Claim Language |
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| 78 | 88 | Unlike original patent claim 78, presented reissue claim 88 recites the language a non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere," also recites the language "a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm", also recites the language "said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means," also recites the language "the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode," and also recites the language "said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage."<br><br>Unlike original patent claim 78, presented reissue claim 88 does not recite the language "wherein the sensing, counter, and reference electrodes each have a first side opposite a second side, and wherein the ionic and electronic conducting materials are continuous from the first side to the opposite second side within each of the sensing, counter, and reference electrodes." |